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Stability of Work Environment Perceptions: Stability versus Change in Autonomy, Control, and

Innovation

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Abstract

Seven-year change in perceptions of one's work environment in a sample of SLS subjects was assessed using three scales from the Work Environment Inventory (WEP; Moos, 1981): autonomy, worker control, innovation. The total sample from SLS (N = 936; 407 males and 529 females) had a mean education of 16.0 years (*range* = 6–20). Average age was 42.8 (range = 21–81) and average occupation level was 6.8, where 6 is clerical or sales and 7 is proprietors and managerial occupations (*range* = 0–9; unskilled laborer – professional requiring MA or Ph.D). Overall stability of WEP was moderate (r = .27-.53). Change in work perceptions was assessed at the individual level by gender and by age group: young (21–34 years), young middle-aged (35–45 years), old middle-aged (46–54 years), and old aged (55+ years). Participants were classified into one of three change categories for each of the three perception domains: (1) reliable decrease in perceived level, (2) no reliable change, (3) reliable increase in perceived level. Chi square analyses found that age group was significantly related to perceived stability for two domains (control, p<.01; innovation, p<.01). The old middle-age and old age groups perceived more decreases in worker control than the young adult age group. The young adults perceived more gains in worker control than the old adults. There were no age differences in perceived stability of worker control. The old age group perceived less stability in innovation than the young adults and the young adults perceive more gains in innovation than any of the other age groups. The middle-age groups perceived more decline in innovation than either the young or old age groups. Gender was not significantly related to change in work perceptions. Hierarchical regression analyses found that change in WEP is predicted by values of WEP seven years earlier and is related to concurrent employer domain values (employer control, job complexity, job routine). An increase in autonomy over 7-years was predicted by lower ratings of employer control, higher ratings of job complexity and by fewer job changes, in addition to Time 1 autonomy scores. An increase in worker control over 7-years was predicted by lower ratings of employer control and younger age, in addition to higher ratings of perceived worker control and innovation at time 1. An increase in perceived innovation over 7-years was predicted by lower perceived employer control, higher ratings of job complexity and by younger age, in addition to Time 1 perceived innovation scores.

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Research in the area of work and adulthood is becoming increasingly important,

especially with the growth of the aging workforce. The impact of the Baby Boomer generation

rapidly approaching retirement on social policy, such as Social Security benefits delays and the

age of retirement, is making the study of work and aging a critical area of research. There are

two major literatures in the area of work, one that relates the influences of the work environment

to a variety of outcomes, such as cognition, health, and well-being (Kohn & Schooler, 1983;

Schooler, 1983; Gould, 1979; Schooler, Mulatu, & Oates, 2004; Wooten, Barner, & Silver,

1994; Spector, 1986; Janssen, 2000). The other important area of research pertains to spillover

effects between work and the family, where the work environment exerts influences on one's

family and the family has influences on one's work (Crouter & McHale, 2003; Menaghan &

Parcel, 1995).

Because research has found evidence that personal attributes and demographic factors

account for individual differences cognitive performance (Schaie, 1989), the workplace is an

important area to study in regards to its effect on personal attributes. Further, workplace and

employee characteristics are important components of the contextual factors that lead to

individual differences in areas such as well-being, and health. For example, past research has

found that work environment characteristics have an impact on worker cognition as well as

satisfaction and self-direction (Kohn & Schooler, 1983; Schooler, 1983; Gould, 1979; Schooler,

Mulatu, & Oates, 2004). Specifically, Schooler and colleagues (2004) found that there continues

to be a reciprocal relationship between work environment characteristics, cognition, and self-

directedness even in late life. Thus, there is ample evidence that the work environment has

important implications for a variety of domains for individuals.

To make the conceptualization of the influence of effects of the work environment more complex, it is important to consider work-family spillover effects. As illustrated in previous research, the work environment and family environment have mutual influences and it is often very difficult to tease apart which context is affecting the other (Crouter & McHale, 2003; Menaghan & Parcel, 1995). However, in addition to examining characteristics of the workplace and employees in relation to various personal attributes, it is important to take employee perceptions of the workplace into consideration.

Many studies have found a variety of work environment perceptions associated with outcomes such as cognition and job satisfaction. Wooten, Barner, and Silver (1994) found that perceptions of ideal work environments were associated with cognitive style.   In addition, Spector (1986) found that perceptions of control in the work environment were positively related to job satisfaction, motivation, commitment, job performance, and involvement. Also, Janssen (2000) found that employee perceptions of the ratio of effort to rewards at work influence whether employees respond to job demands in an innovative manner. Specifically, individual workers who perceived a high level of rewards to effort at work were more likely to be creative and innovative when dealing with job demands. Therefore, the literature suggests that in addition to actual work environment characteristics, perceptions of the work environment play an important role in individual outcomes.

Given the findings from previous research on the importance work environment perceptions (WEP), this study focused on three questions regarding change over time in work environment perceptions. First, do work environment perceptions illustrate change over a 7-year time interval. Second, does change in the work environment perception domains vary by age group or gender. Third, what factors predict change in work environment perceptions; four

domains were considered: Time 1 WEP scores, concurrent employer domain variables, work

structure variables, and family and demographic variables.

Method

Sample

The participants in this study were assessed in two waves as part of the Seattle

Longitudinal Study (SLS; n = 412) and the Family Similarity Study (n = 528). Participants in

the SLS were tested in 1991 and 1998, whereas participants in the Family Similarity Study were

tested in 1989 and 1996. Individuals in the Family Similarity Study were the siblings and

children of members of the SLS.

The total sample consisted of 936 individuals (407 males and 529 females). All

participants were working part-time of full-time at both time points. The sample was well-

educated (M = 16.0 (2.36) years, *range* = 6 – 20); the average age was 42.8 (10.77) (*range* = 21

– 81) at the first time of measurement. Four age groups were considered (at Time 1); young

adults (ages 21 – 34), young middle-age (35 – 45), old middle-age (46 – 54) and old age (55 +).

In addition, the mean occupational level for men was 6.9 (2.2) and the mean occupational level

for women was 6.8 (1.9), where 6 is clerical or sales occupations and 7 is proprietors and

managerial occupations on a scale of 0 – 9 (unskilled laborer – professional requiring MA or

Ph.D).

Dependent Measures

Work Environment Perceptions. The three WEP domains came from the Work

Environment Inventory (Moos, 1981). They were shortened to five items for each scale, and the

individual items were converted to 5-point Likert scales from 1 = strongly disagree to 5 = strongly agree. The WEP dimensions are thought to measure the following three domains.

> *Autonomy*. This scale assessed employees perceptions of being encouraged to be self-sufficient and make their own decisions. Example: "You have a great deal of freedom to do as you like in your workplace."
>
> *Worker Control*. This scale assessed employee perceptions of control in his/her work environment. Example: "You are expected to follow set rules in doing your work." Scores were reversed to make higher levels of control represent high levels of worker control over.
>
> *Innovation*. This scale assessed employee perception of whether variety, change, and new approaches in their work were emphasized.
>
> Example: "You are encouraged to do your work in different ways."

Predictors

Employer Domain Variables. Exploratory factor analysis was performed on a range of work variables in the Life Complexity Inventory (LCI; Gribbin, Schaie & Parham, 1980) to create three employer domain factors for Employer Control, Job Complexity, and Job Routine (DeFrias, 1998) based on previous work by Schooler (Kohn & Schooler, 1983; Schooler, 1984). All employer domain factors used in this research were at time two. The worker control factor was created from variables measuring the number of employees one deals with on a daily basis, work speed, and work pressure. High levels of employer control indicate that the employer has a great deal of control over the individual's work environment. The job complexity factor was created from variables measuring the number of hours spent reading at work, number of hours spent talking to people at work, the number of employees one deals with on a daily basis, and

work pressure. High values of job complexity indicate jobs that are highly complex. The job routine factor was created with variables measuring the number of hours one works with their hands at work, the type of work one does, and how long it takes to complete a task at work. High levels of job routine indicate a job that is highly routenized.

Work Structure Variables. Additional work structure variables from the LCI (Gribbin, Schaie & Parham, 1980) were included based on significant correlations with the time 2 WEP values. The work structure variables considered to be potential predictors of change in work perceptions included degree of employment (full-time or part-time), frequency of changes in one's place of employment over the last 5 years, frequency of changes in one's trade or profession over the last 5 years, and participation in on-the-job-training. Only those work variables significantly correlated with the individual WEP values at time two were included in the hierarchical regression models.

Demographics. Data from the LCI (Gribbin, Schaie & Parham, 1980) provided information about demographics. The demographic variables considered to be potential predictors of change in work perceptions included individuals marital status, years of education, total family income at Time 1 (1989/91), number of children living at home, occupational status (ranging from unskilled labor to professional, requiring a graduate degree), and gender. The variables assessing marital status and the number of children living at home were included to account for the possible work-family spillover effects on WEP. The years of education variable was derived from a single item on the LCI (Gribbin, Schaie & Parham, 1980), where 1 through 8 years were listed as Grade school, 9 through 12 years were listed as High school, 13 through 16 years were listed as College, and 17 – 20 years were listed as Graduate school.

Classification of change in perceptions at the individual level.

Change over seven years on each WEP domain was computed. Three categories of change were defined using one standard of error of measurement as the criterion for significant change (Dudek, 1979) in the level of that dimension of WEP. The three categories of change were: (1) significant decrease in perceived level of the domain (e.g., autonomy), (2) no significant change in perceptions (i.e., stable perceptions), (3) significant gain in work perceptions. It should be noted that, although the worker control scale actually reflects the perception of lack of control individuals have in their work environment, the items were reverse-scored to make high levels of perceived worker control reflect individuals who had strong control over their work environment to make the interpretation of results more straightforward.

<div align="center">Results</div>

Three questions were examined in this study. First, is there change over a 7-year time interval in work environment perceptions. Second, does change in the three WEP domains vary by age group or gender. Third, what factors predict change in WEP; four domains were considered: Time 1 WEP scores, concurrent employer domain variables, work structure variables, and family and demographic variables.

Change in work perceptions over 7 years

As shown in Table 1, correlations of WEP were weakest for the autonomy domain in the young age group (.27) and for worker control in the old age group (.29). The lowest correlations indicate change, as illustrated in chi square and regression findings. Correlations for WEP illustrated the least change for the innovation domain and most change in the worker control domain. In addition, individuals were assessed by being placed in one of three categories of

change for each of the three WEP domains. The percentage of individuals with no significant

change (i.e., within $\pm$ 1 SEM) was considered for each of the three domains. In the total sample,

the percentages of individuals with stable perceptions of their work environment over a seven

year period for the three domains were: 59% (autonomy), 57% (worker control), and 53%

(innovation).

Relationship of perception stability to age group and gender

Chi-square analyses were performed to assess whether age group (4 levels: young, young

middle-aged, old middle-aged, and old aged) and gender affected the stability of the WEP

domains. Individuals were placed in one of three groups for stability of WEP for the three

domains: significant decrease at time 2, stable at time 2, or significant gain at time 2. As shown

in Table 2, results illustrated that gender was not significantly related to the stability of WEP for

all three domains. However, results of the chi-square analyses did find significant relationships

between two of the WEP domains and age group (worker control, $p < .01$; innovation, $p < .01$).

The perceived level of autonomy was not significantly related to age groups.

As illustrated in Table 2, the old middle-age and old age groups perceived more

decreases in worker control than the young adult age group. The young adults perceived more

gains in worker control than the old adults. However, there were no age differences in perceived

stability of worker control. In relation to perceived innovation, Table 3 illustrates that the old

age group perceived less stability in innovation than the young adults and the young adults

perceived more gains in innovation than any of the other age groups. Finally, the middle-age

groups (young middle-age and old middle-age) perceived more decline in worker innovation

than either the young or old age groups.

What Predicts Change in WEP Domains Over a Seven Year Interval

Hierarchical regression analyses were performed to assess whether the WEP values at time 1 and the employer domains (employer control, job complexity, job routine) are significant predictors of the change in the three WEP domains after a seven year interval. It is important to note that because the employer domains are concurrent measures with the time two values of WEP, they would indicate a relationship as opposed to predicting change. The steps in the model include the time 1 WEP domain values, time 2 employer domain values, work structure variables that were significantly correlated with the individual WEP domain values at time two (number of changes in jobs and on-the-job-training for perceived autonomy, on-the-job-training and the number of changes in professions for perceived control, working full-time or part-time for perceived innovation) demographic variables (with marital status and number of children living at home controlling for spillover effects), and age.

Autonomy

As illustrated in Table 4, after including the three employer domains (employer control, job complexity, job routine) , work structure variables (number of changes in jobs and on-the-job-training), demographic variables and age, the WEP value for autonomy at time 1 was a significant predictor for change in perceived autonomy at time two ($p < .001$). The time 1 value for perceived innovation was also a significant predictor of change in autonomy ($p < .05$). In addition, even after controlling for demographic variables and age, low levels of employer control and high levels of job complexity were significantly related to the concurrent values of perceived autonomy ($p < .001$).   Finally, fewer job changes were related to higher levels of perceived autonomy ($p < .05$). The full model for the prediction of change in perceived

autonomy accounted for roughly 24% of the variance (R^2=.24), which was a 4% improvement from using only time 1 WEP levels as a predictor of change (R^2=.20).

Control

As illustrated in Table 5, after controlling for individual work variables, demographic variables and age in the full model, both time 1 levels of perceived worker control and perceived innovation were significant predictors of the change in perceived worker control (p< .001). In addition, the employer domain for employer control was a significantly related to the concurrent level of perceived worker control at time 2 (p< .001). Thus, an increase in worker control was predicted by lower ratings of employer control and younger age, in addition to higher ratings of perceived worker control and worker innovation at time 1. Overall, the full model accounted for roughly 21% of the variance in the WEP value for control (R^2=.21), a 5% increase in variance accounted for when time 1 levels of the three WEP domains were the only predictors (R^2=.21).

Innovation

As illustrated in Table 6, after controlling for the degree of employment, demographic variables, and age, the time 1 value for perceived innovation was a significant predictor of change in perceived innovation (p<.001). The employer domains for employer control and job complexity were also significantly related to the concurrent value of perceived innovation (p<.01). Thus, an increase in perceived innovation was predicted by lower perceived employer control, higher ratings of job complexity and by younger age, in addition to time 1 perceived innovation levels. The full model accounted for 26% of the variance in perceived innovation (R^2=.26), only a 2% increase in variance accounted for when time 1 WEP levels are the only predictors in the model (R^2=.24).

Discussion

This study examined the stability of three WEP domains (autonomy, innovation, and worker control) across a 7-year period, as well as examined what variables predict change in WEP values. The first research question addressed whether there is change in perceived autonomy, worker control and innovation in the workplace over a 7-year period. The findings showed a positive relationship between time 1 and time 2 values of the three WEP domains, suggesting that the perceptions are fairly stable. However, worker control seemed to be experiencing the most change, with innovation being the most stable.

The second research question was whether individuals classified into groups of stable, gain, or decrease in the level of work environment perceptions over a 7-year period varied by gender or age group.   The results found that there were no significant differences in the change group categories by gender. However, there were significant differences in WEP change group category comparisons between the 4 age groups for the domains of worker control and innovation. An interesting finding was that in regards to individuals who were categorized as having decreased perceived innovation after a 7 year time interval, there were no significant differences between the young and old age groups but differences were significant in all other age group comparisons. Why then was there no difference on decreased levels of innovation between the youngest and oldest age groups in this sample? Perhaps the explanation for this lack of a difference is due to the fact that there were fewer decliners in the youngest and oldest age groups relative to those who remained stable and increased in their perceptions of innovation than in the other age groups. Thus, since the youngest and oldest age groups had so few individuals who declined in perceived innovation, the two groups were not significantly different from each other.

The final research question addressed what factors were significant predictors of change in WEP over 7 years. The different groups of factors used were the time 1 values of WEP, the concurrent employer domain variables, work structure variables, and family and demographic variables. The results found that for each WEP domain, the time 1 value was a significant predictor of change. For perceived worker control, the time 1 WEP domain value for innovation was also a significant predictor of change. In relation to the three employer domains, employer control was a significant predictor in the full models for each of the three WEP domains. For each WEP domain, less employer control was significantly related to gains in work environment perceptions.

The employer domain for job complexity was a significant predictor in the full model for perceived autonomy and perceived innovation. A potential reason for why job complexity may not have been a significant predictor for perceived worker control is that there are highly complex occupations that can have high levels of employer control as well as low levels of employer control. An example of a highly complex job with high levels of control would be a human resources employee in a large firm where there are many regulations and policies regarding how and when work should be done. This job would involve a great deal talking to other employees, dealing with other employee problems and dealing with work pressure, all of which were used to create the complexity domain. However, this job also has a great deal of employer control of one's practices and work, leading to low levels of worker control. In opposition, there are also jobs that have high levels of complexity that may lead to high levels of perceived worker control. An example of this would be a college professor. This occupation requires a great deal of reading, talking with people, dealing with people, and time pressure, all of which make up complex jobs. However, a college professor is also fairly autonomous with

their work, has their own projects, and usually has the final say in what materials they teach to students. This combination would lead to high levels of worker control and job complexity.

It is also important to note that marital status and the number of children living at home had no effects on the prediction of change in perceptions of the work environment. This suggests that spillover effects were not having an influence on one's perceived autonomy, worker control, and innovation.

A potential limitation of this research is that there was very little racial diversity represented in the study. Future research should examine the stability and predictors of WEP domains in a racially diverse sample to assess whether race has any influence on one's perceptions of the work environment. It would also be beneficial to expand on previous research by examining whether WEP is a significant predictor of outcomes in relation to health and well-being. Additional research may also want to examine whether changes in perceptions of WEP are significant predictors of cognitive ability, cognitive decline, health status, and well-being. It would also be important to make further inquiries as to the lack of work-family spillover in this study. The phenomenon of spillover effects is wide-spread and therefore, the lack of an effect in this research needs to be examined further.

Table 1. *Correlations of Work Perceptions over 7 years: Total Sample and by Age Group.*

Work Environment Domain	Total (N=936)	Age Group			
		Young (N=232)	Young-MA (N=347)	Old-MA (N=233)	Old (N=124)
Autonomy	.44	.27	.53	.42	.46
Control	.40	.40	.44	.40	.29
Innovation	.50	.52	.51	.50	.49

Note. The correlation for Control in the Old age group was significant at $p < .01$; all other correlations were significant at $p < .001$.

Table 2. *Categories change in perceived worker control by age group.*

	Young	Young MA	Old MA	Old
Stable	54.3	54.2	46.8	53.2
Decrease	26.7	32.3	39.5	34.7
Gain	19.0	13.5	14.0	12.1

Note. The chi-square test for control change category by age group was significant at $p < .01$

Table 3. *Categories change in perceived worker innovation by age group.*

	Young	Young MA	Old MA	Old
Stable	44.0	45.8	49.4	57.3
Decrease	23.7	32.9	31.3	22.6
Gain	32.3	21.3	19.3	20.2

Note. The chi-square test for innovation change category by age group was significant at $p < .01$

Table 4. *Categories of perception change by gender.*

		Autonomy	Control	Innovation
Stable	Male	27.5	25.1	23.5
	Female	31.6	31.6	29.1
Increase	Male	8.0	6.6	10.1
	Female	12.2	9.5	14.5
Decrease	Male	8.0	11.8	9.9
	Female	12.7	15.4	13.0

Note. All chi square tests were not significant, $p > .05$.

Table 5. *Hierarchical regression analysis for perceived worker autonomy (N=936).*

	Step 1 B	Step 2 B	Step 3 B	Step 4 B	Step 5 B
WEP Domains (Time 1)					
Autonomy	.35***	.32***	.31***	.34***	.34***
Worker Control	.06	.03	.03	-.01	.00
Innovation	.06	.07	.08*	.08*	.08*
Employer Domains (Time 2)					
Employer Control		-.24***	-.24***	-.23***	-.23***
Job Complexity		.13***	.14***	.14***	.14***
Job Routine		-.03	-.02	-.03	-.03
Time 1 Work Structure					
# Change in Jobs			-.08**	-.07*	-.07*
On-the-job-training			.05	.06	.06
Demographics					
Marital Status				.04	.05
# Kids Living at Home				.00	-.01
Education				.00	.00
Occupational Status				-.06	-.06
Income (Time1)				.05	.05
Gender				-.01	-.01
Age					-.01
R^2	.20	.22	.22	.24	.24
ΔR^2		.02	.00	.02	.00

Note: * $p<.05$; ** $p<.01$; *** $p<.001$

Table 6. *Hierarchical regression analysis for perceived control (N=936).*

	Step 1 B	Step 2 B	Step 3 B	Step 4 B	Step 5 B
Time 1 WEP Domains					
Autonomy	.04	.01	.00	.00	.00
Worker Control	.29***	.25***	.25***	.22***	.24***
Innovation	.13***	.14***	.15***	.14***	.13***
Employer Domains (Time 2)					
Employer Control		-.23***	-.23***	-.22***	-.22***
Job Complexity		.07	.07	.05	.04
Job Routine		-.06	-.06	-.05	-.05
Time 1 Work Structure					
On-the-job-training			.03	.03	.03
# Change in Professions			-.03	-.03	-.04
Demographics					
Marital Status				.00	.02
# Kids Living at Home				.03	-.01
Education				.07*	.07
Occupational Status				-.02	-.01
Income (Time1)				.06	.07
Gender				.00	.00
Age					-.11**
R^2	.16	.19	.19	.20	.21
ΔR^2		.03	.00	.01	.01

Note: * $p<.05$; ** $p<.01$; *** $p<.001$

Table 7. *Hierarchical regression analysis for perceived innovation (N=936).*

	Step 1 B	Step 2 B	Step 3 B	Step 4 B	Step 5 B
Time 1 WEP Domains					
Autonomy	-.03	-.01	-.02	-.01	-.01
Worker Control	.02	.01	.01	.00	.02
Innovation	.49***	.46***	.46***	.45***	.45***
Employer Domains (Time 2)					
Employer Control		-.11**	-.11**	-.10**	-.10**
Job Complexity		.16***	.14***	.13***	.13**
Job Routine		-.03	-.03	-.03	-.03
Time 1 Work Structure					
Degree of Employment			-.07*	-.07*	-.06
Demographic					
Marital Status				-.03	.02
# Kids Living at Home				.03	.00
Education				.04	.04
Occupational Status				.01	.01
Income (Time1)				.03	.04
Gender				.04	.03
Age					-.07*
R^2	.24	.25	.25	.26	.26
ΔR^2		.01	.00	.01	.00

Note: * p<.05; ** p<.01; *** p<.001

Figure 1. *Frequency of subjects in change categories by age group for perceived control.*
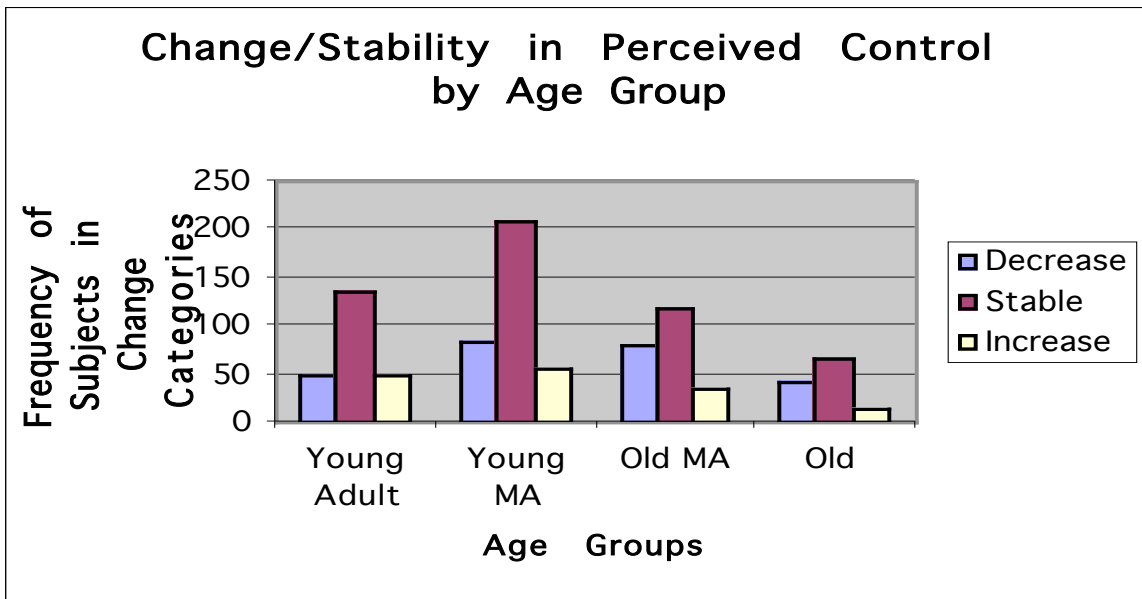
Figure 2. Frequency of subjects in change groups by age for perceived innovation.