Chance events in career development: Influence, control and multiplicity

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ABSTRACT

This article reports three studies on the nature and impact of chance events. The first study investigated chance events in terms of the dimensions of influence and control. The second and third studies investigated the effects of multiplicity of chance events on career development are in terms of respondents' own careers and then in terms of career scenarios. Results indicated that chance events can be characterized by the interactive influence of influence and control. High influence and low control chance events had the biggest impact on career development. When there is a connection between multiple chance events, the impact is greater than when unrelated chance events occur. The finding was confirmed regardless of whether individuals rated their own experiences or those presented in scenarios. However, it was also found that negative outcome chance events had the greatest impact regardless of whether such events were single or multiple influences on individuals' careers. The results provide further support for the integration of chance events into the Chaos Theory of Careers.

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1. Introduction

Career theorists have given limited attention to chance events. Crites (1969) accident theory, Osipow's (1973) chance theory of vocational selection, and Pryor and Bright's (2003) Chaos Theory of Careers have recognized the presence and influence of chance on career decisions. However, apart from other sporadic efforts such as Chen (2005), Miller (1983) and Mitchell, Levin and Krumboltz (1999), the impact of chance or unplanned events on career development has been neglected or at least underestimated. Most career development literature has tended to emphasize the agentic propensities of individuals to make career decisions and to proactively construct their careers (e.g. Savickas, 2005).

Research on chance in career development has focused on a range of topic areas: incidence, attribution, diverse populations, event categories, multiplicity effects, and dimensionality.

1.1. Incidence of chance events

Roe and Baruch (1967) conducted a study on 30 participants from different work professions and found that most participants attribute their career influences to a myriad of chance events. Likewise, Hart, Rayner, and Christensen (1971) examined the career histories of 60 men at different occupational entry levels and found that the vocational histories of skilled and semi-skilled workers were often influenced by chance events. In a study of 917 nonprofessional workers, Salomone and Slaney (1981) found that chance events were perceived to have an impact on the workers' vocational decisions. Scott and Hatal-

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la (1990) also found similar results in a study on the career patterns of college educated women. Bright, Pryor, Wilkenfeld, and Earl (2005) identified chance events among the major influences on students' career development.

1.2. Attribution of events to chance

According to the fundamental attribution error, people have a tendency to underemphasize situational factors when making attributions about their actions (Ross & Nisbett, 1991). Caplow's (1954) study concluded that error and accident often have a greater impact on their careers than their participants were willing to concede. Bright, Pryor, and Harpham (2005) tested individuals' response attributions against locus of control and concluded that these attributions for chance events could not be accounted for by attribution factors alone. However, Bright et al. (2005) did find some relationship between locus of control and chance events such that people who tended to attribute causes to factors beyond their own control ("externals") were more likely to report chance events. Although this effect alone cannot account the reporting of chance events, it does suggest that there may be some scope to alter individual's attitudes to chance events which is consistent with Gelatt's notion of positive uncertainty (Gelatt, 1991).

1.3. Diverse populations

Betsworth and Hanson (1996) found that in their sample of older adults, 63% of men and 58% of women indicated that their careers were influenced by chance events. Similarly, Williams, Soeprapto, Like, Touradji, Hess and Hill (1998) found that 13 academic women in counseling psychology also indicated that their career choices were significantly influenced by at least one chance event. Bright et al. (2005) with a survey sample of 772 high school and university students found that 69% of the students reported that chance events had some influence on their career decisions. These studies indicate that the influential effect of chance on career decisions can be found across a diverse group of individuals.

1.4. Multiple chance events impact

Guindon and Hanna (2002) found that through the use of case studies that participants revealed accounts of the presence and influence of a series of connected chance events on their career paths. Williams et al. (1998) observed the presence of multiple chance events reported by some participants in their study on career development. Wiseman (2003) also observed the influence of multiple linked chance events on some of his participants' career choices. Thus while the incidence of multiple chance events on careers appears evident from these studies there has been no research to investigate the impact of single chance events in comparison with multiple chance events on individuals' careers. Also the issue of whether there is a difference of impact if multiple chance events are perceived as connected or discrete, has not received empirical attention. The current research seeks to investigate both these issues and also sought to take into account whether there were differences across these conditions depending on whether the chance events were either positive or negative for individuals' careers.

1.5. The dimensionality of chance events

In the Betsworth and Hanson (1996) study, participants were requested to remember "influential" events and typically give examples beyond their control. Recall measures are generally regarded as indicating that the material recollected is more readily available in memory because it either better encoded due to its relevance or its relationship to pre-existing memory schemas or because the material or similar material has been recalled more recently (e.g. Baddeley, 1990). However, to date there has been no research which establishes that influence and control are actual perceived dimensions of chance events nor on their relative and interactive importance. The research to be presented also addresses these issues.

Further the current research also investigated whether there were differences in the perceived career impact for positive outcome chance events in comparison with negative outcome chance events. We also wanted to research whether such outcome effects might alter the impact of the other issues being addressed in this research.

Research to date on the role of chance events in career development has been sporadic and despite occasional calls for further research, little has been forthcoming. While many theories of career choice acknowledge the existence of chance events in careers there has been little theoretical or empirical investigation of the nature, structure and impact of such events. While the theoretical gap in our understanding of chance events in careers is addressed in the CTC, significant further empirical work is also required to address this gap. The studies reported here are an attempt to address this gap and they represent an extension of Bright et al.'s (2005) empirical investigation of chance events in careers, through a closer consideration of the nature, structure and perception of chance events.

Therefore the three studies reported below sought to investigate the perceived relative importance and impact on individuals' careers of the levels of influence and control of both positive and negative multiple chance events as well as the perceived levels of connection between multiple chance events.

2. Study 1

2.1. Method

2.1.1. Participants

Forty-three university students voluntarily participated in the study and received no incentives in this and the other studies reported. The participants consisted of 15 men and 28 women between the ages of 18 and 40 ($M = 21.05$, $SD = 4.21$) with up to 17 years of work experience ($M = 2.67$, $SD = 3.14$).

2.1.2. Procedures and materials

Participants completed two questionnaires individually or in groups of up to three.

Questionnaire 1. Eight scenarios describing the effect of different chance events on the careers of eight characters were constructed to assess recall of chance events. In the first part, participants were asked to identify the chance event in each scenario and to rate the extent to which the chance event had influenced the character's career on a 5-point scale from low to high. Participants were also asked to evaluate the extent to which the character had control over the aftermath of the event on a 5-point scale, 1 being "little can be done, just get on with it" and 5 meaning the person had "complete discretion in how to proceed". The eight scenarios depicted every possible combination of low and high control and low and high influence.

On completion of the questionnaire, participants were presented with a surprise memory test that required them to recall the previously presented chance events.

Questionnaire 2. Thirty-two sets of statements were constructed to assess the extent to which the level of influence and the level of control of chance events can be independently identified. Eight sets were created for each of the four chance events categories. Each set comprised two statements describing a chance encounter and its effect on the person's career. Participants were asked to evaluate the level of influence and the level of control using the same 5-point scales used in Questionnaire 1.

2.2. Results

2.2.1. Recall of chance events

In Questionnaire 1, participants obtained a score of 1 for each chance event accurately recalled. For a given chance events category, the mean recall score was the average of all recall scores for scenarios in the particular chance event category. The mean score could therefore range from 0 to 1, and higher scores indicate higher accuracy in recall of chance events in a particular category. The mean and standard deviations (in parentheses) for the four chance events categories were: low influence, low control $M = .37$ ($SD = .33$); low influence, high control $M = .58$ ($SD = .36$); high influence, low control $M = .81$ ($SD = .27$); high influence, high control $M = .55$ ($SD = .38$). Among the four chance events categories, highly influential chance events that were low in level of control were better remembered by participants whereas mildly influential chance encounters that were low in level of control had the lowest recall rate.

A 2×2 (level of influence $\times$ level of control) analysis of variance was conducted to assess whether the level of influence and the level of control associated with a chance event influenced the accuracy of its recall. On average, participants had better recall over chance events that were described to be highly influential ($F(1, 42) = 13.22$, $p < .05$) than those that are mildly influential. However, the level of control associated with a chance event did not relate to the participant's recall ($F(1, 42) = .33$, $p > .05$). Participants could recall chance events that were high in level of control as accurately as those that were low in level of control. The level of influence and the level of control together had a significant interaction effect on recall ($F(1, 42) = 25.69$, $p < .05$). When chance events were described as mildly influential on a person's career, participants could recall those events over which the character had more discretion over the aftermath of the encounter better than those when the character had little control over its consequence. In contrast, when the chance events were highly influential, those with consequences that were out of one's control were better remembered than those that were associated with a high level of control.

There was no significant association between the dimensions of perceived control and influence of chance events on Questionnaire 2 ($r = -.12$, $p > .05$) indicating that the perceived level of influence of chance events is independent from the perceived level of control the character has over the consequences of the events.

A 2×2 analysis of variance (level of influence $\times$ level of control) was conducted to determine whether participants were sensitive to the influence manipulation and whether their responses to the dimensions were independent. Results indicated that the influence manipulation had a significant effect on the perception of influence ($F(1, 42) = 556.48$, $p < .05$) with an effect size of .93 ($\eta^2 = .93$). On the 5-point scale, the mean perceived level of influence increased from 1.96 to 4.64 as chance encounters were described to be more influential. The level of control described had a significant effect on the perceived level of influence ($F(1, 42) = 6.60$, $p < .05$). However, the effect ($\eta^2 = .14$) was small and, in a practical sense, may not be that important as the mean perceived level of influence only decreased by 0.13 on the 5-point scale from chance events that were low in control ($M = 3.37$) to those that were high in control ($M = 3.24$). There was no significant interaction between the level of influence and the level of control on the perceived level of influence ($F(1, 42) = 0.05$, $p > .05$, $\eta^2 = .00$).

2.2.2. Perception of the level of control

Another 2 × 2 (level of influence × level of control) analysis of variance was performed to examine potential factors that might influence participants' perception of how much control an individual has over the consequences of a chance encounters. Results indicated that the levels of control described in the scenarios have a significant effect on participants' perception ($F(1, 42) = 494.32$, $p < .05$, $\eta^2 = .92$). The perceived level of control increased (from $M = 2.13$ to 4.36) as the characters in scenarios were described as having increasing discretion over how to proceed after a chance encounter. Results also indicated that the level of influence described had a significant effect on the perceived level of control ($F(1, 42) = 11.38$, $p < .05$). However, the effect was relatively trivial ($\eta^2 = .21$) in a practical sense as the mean perceived level of control only decreased by 0.24 on the 5-point scale from chance events that were mildly influential ($M = 3.37$) to those that were highly influential ($M = 3.12$). There was a significant interaction between the level of influence and the level of control ($F(1, 42) = 40.34$, $p < .05$, $\eta^2 = .49$). The perceived level of control increased as characters were described to have increasing discretion over how to proceed after a chance encounter. The magnitude of such increase was greater for chance events that were highly influential compared to those that were only mildly influential. In other words, being highly influential makes highly controllable chance events seem more controllable and makes relatively uncontrollable chance events seems to be even more out of one's control.

2.2.3. Inter-item reliability

The mean inter-item correlation coefficients on the level of influence and the level of control for each chance events category for Questionnaire 2 were calculated to provide an appropriate estimate of scale reliability. Briggs and Cheek (1986) recommend that for scales under 10 items the mean inter-item correlation coefficient should be the appropriate measure of reliability. They recommend an optimal range between .20 and .40. The correlation coefficients ranged from .19 to .48, indicating six of the eight measures had acceptable internal consistency. The perceived level of influence was relatively less reliable for the low-in-influence high-in-control chance event category and for the high-in-influence high-in-control category. While they can be considered an acceptable reliable measure for our purpose here, both would benefit from additional items to improve their reliability.

2.3. Discussion

The results indicate that level of influence and level of control are two independent dimensions of chance events. Furthermore, individuals do not recall all types of chance events equally well. Highly influential chance encounters that are beyond one's control are more likely to be remembered than any other types of chance events.

These results extend the work on chance events of Bright, Pryor, and Hapham (2005) and Bright, Pryor, Wilkenfeld et al. (2005) in providing further evidence that chance events in career development not only need to be considered more carefully, but that any consideration of chance must take into account the nature of such events. The following research studies extend this line of reasoning further, by exploring yet another dimension of chance events that have attracted relatively little attention in the literature—the role of multiple chance events. In the first study, we ask participants to recall and rate different types of single and multiple chance events. In the final study we ask participants to judge different types of chance event.

Understanding more about the effects of multiple chance events may be helpful in assisting individuals with preparing and coping with their potential career development impact. This study investigated the presence, frequency and influence of multiple chance events on both negative and positive career outcomes. For instance, how commonly do people report on multiple chance events and what are the impacts of these events on their career decisions? What is the likelihood of these events happening to them in future? In particular, it was hypothesized that:

Hypothesis 1. There is greater presence and frequency of single and concatenated chance events than multiple independent chance events.

Hypothesis 2. The influence of concatenated chance events on participants' career choices is greater than the influence of either single or multiple independent chance events.

Hypothesis 3. Participants in general are more optimistic about having positive chance events happening to them in the future.

A secondary aim of the study was to examine the relation between locus of control orientation and influence of multiple chance events, as a follow-up to Bright et al. (2005) who reported a significant positive correlation was reported between locus of control orientation and the perceived influence of chance events on career decisions. Hence it was hypothesized that:

Hypothesis 4. There is a positive relation between locus of control orientation and the perceived influence of multiple chance events on career outcomes.

3. Study 2

3.1. Method

3.1.1. Design

This study used a within-subjects repeated measures design, with 2×3 factors, yielding six conditions. The two independent variables were the type of chance events and the type of career outcomes. The dependent variables were the frequency, perceived influence and future likelihood of the chance events. Participants were asked to recall and rate single and multiple chance events they had experienced in the past.

3.1.2. Participants

There were 62 university students and working adults from a variety of professional backgrounds who volunteered to participate in this study. The participants consisted of 28% males and 72% females, with age ranging from 18 to 56 years old ($M = 25$, $SD = 8.33$). Their average duration for paid employment ranges from 0 to 32 years ($M = 5.6$, $SD = 7.34$).

3.1.3. Procedure

Participants were tested individually or in groups of up to 3 people. All the participants were given a questionnaire pack to complete. The questionnaire pack consisted of a chance events recollection survey and a personality scale.

3.1.4. Materials

Chance events recollection survey. This survey was constructed for the purpose of this study. It consisted of demographic items (i.e. age, gender, and duration of paid employment) and six different categories of chance events the study aimed to investigate. These categories were single positive (SP) and negative (SN), multiple-related (concatenated) positive (MCP) and negative (MCN), and multiple independent positive (MIP) and negative (MIN) chance events.

For each of these categories, participants were asked to recall relevant chance events they had personally encountered. They also answered four questions yielding personal estimates of the presence, frequency, influence and future likelihood of each chance events category. For instance "Have you experienced a single chance event that had a negative impact on your career?" and "if yes, how often?" other than this Yes/No question, the rest used a 5-point scale with the two extreme ends variously labelled as very rarely/very often, no influence/great influence and not likely/very likely.

The survey was constructed to provide a clear conceptualization of the six different categories of chance events. Specifically, participants were instructed to read a general definition of chance events before attempting the survey. In addition, specific examples for each of the six chance events categories were provided for the participants to assist them in understanding the concepts of single and multiple chance events.

Two specific examples were given for each of the categories of chance events. The first example describing a commonplace and generally relatively unimportant event such as a chance meeting with a friend, or losing your mobile phone. The second example by contrast described an infrequent and more serious event such as an accident or illness. See Appendix 1 for examples.

Participants were also requested to write a brief description of the chance events they had experienced for each category. This additional information provided an opportunity to check the accuracy and validity of the participants' conceptualization of chance events.

3.1.4.1. *Personality scale.* The participants' attributional style was assessed with Craig, Franklin, and Andrews (1984) locus of control of behavior (LCB) scale, which was used by Bright et al. (2005) in a previous study. The LCB scale consists of 17 items that measure a person's perception of control over personal behavior. Higher scores indicate externality (a low sense of personal control), whereas lower scores indicate internality (a high sense of personal control). The psychometric characteristics of the LCB Scale were extensively reviewed by Craig et al. (1984) and were demonstrated to have satisfactory internal reliability ($\alpha = 0.79$) and to be stable over time in the absence of treatment. In the present study, an α reliability was found to be 0.81.

3.2. Results

3.2.1. Main analysis

A Friedman test was used to examine the rankings and differences between the six chance events categories. A nonparametric test was selected in this case because of the unequal sample size in each category. More participants in general reported experiencing single chance events (SP = 82.3%; SN = 66.1%) and multiple concatenated chance events (MCP = 64.5%; MCN = 58.1%) than multiple independent chance events (MIP = 54.8%; MIN = 46.8%) regardless of whether these events produced positive or negative career outcomes see Table 1. Analysis using Friedman test indicates that there are significant differences in participants' reported presence and frequency of chance events across the six events categories (both $p < 0.001$). This is consistent with Hypothesis 1. Participants also reported experiencing these types of events more frequently than multiple independent chance events when the events produced negative career outcomes On the contrary, participants reported experiencing more multiple concatenated and multiple independent chance events than single chance events when these events produced positive career outcomes.

Table 1
Mean rankings from Friedman test.

*Presence		Frequency		Influence		Likelihood	
Events	Ranks	Events	Ranks	Events	Ranks	Events	Ranks
Mean ranks of variables							
SP	2.90	MCP	4.90	MCP	5.25	SP	4.61
SN	3.38	MIP	3.92	SP	4.46	MCP	3.82
MCP	3.43	SP	3.88	MIP	3.42	MIP	3.64
MCN	3.62	SN	3.42	SN	3.08	SN	3.31
MIP	3.72	MCN	2.83	MCN	2.58	MCN	3.06
MIN	3.96	MIN	2.46	MIN	2.21	MIN	3.01

*Note. For variable *presence,* lower score means higher ranking.
SP, single positive events.
SN, single negative events.
MCP, multiple concatenated positive events.
MCN, multiple concatenated negative events.
MIP, multiple independent positive events.
MIN, multiple independent negative events.

Table 2
Intercorrelations between LCB and participants' perceived level of influence.

	SP	SN	MCP	MCN	MIP	MIN	LCB
SP	1	.007	.0340*	.071	.504**	.410*	178
SN	.007	1	.431*	.222	.460*	.291	.061
MCP	.340*	.431*	1	.092	.752**	.205	−.073
MCN	.071	.222	.092	1	−.090	.472*	.306
MIP	.504**	.460*	.752**	−.090	1	.327	.112
MIN	.410*	.291	.205	.472*	.327	1	.008
LCB	.178	.061	−.073	.306	.112	.008	1

Note.
SP, single positive events.
SN, single negative events.
MCP, multiple concatenated positive events.
MCN, multiple concatenated negative events.
MIP, multiple independent positive events.
MIN, multiple independent negative events.
LCB, locus of control behavior.

Concerning Hypothesis 2, initial descriptive analysis revealed that more participants in general perceived positive chance events (SP = 54.9%; MCP = 72.5%; MIP = 55.9%) as having some or great influence on their career outcomes than negative chance events (SN = 26.8%; MCN = 19.4; MIN = 20.7%) regardless of whether they are single or multiple events. Analysis using a Friedman test indicated multiple concatenated chance events are perceived to have significantly greater influence on participants' career outcomes than single and multiple independent events when these events produced positive outcomes (sig. level < 0.001, see Table 1).

With regard to individuals' expectations of future chance events (Hypothesis 3) the general trend is that participants expected more positive chance events (SP = 32.2%; MCP = 30.6%; MIP = 25.9%) than negative chance events in the future (SN = 14.5%; MCN = 14.5%; MIN = 16.2%). Further analysis revealed that participants' level of expectation differed significantly across the six different categories (p < 0.001). Similar to the pattern observed for the self-reported presence of single and multiple chance events, participants expect more single and multiple concatenated chance events happening to them in the future than multiple independent events. This is the case for chance events that produce both positive and negative career outcomes (see Table 1).

Contrary to Hypothesis 4, there was no significant relationship observed between LCB and the influence of single and multiple chance events (see Table 2). There was, however, a moderate correlation ($r = .40$, $p < .05$) between LCB and the reported frequency of multiple independent chance events that produced negative career outcomes for the participants. This means that individuals who are more externally oriented are more likely to report experiencing a series of negative, independent chance events.

3.3. Discussion

Some researchers have observed accounts of multiple chance events from individuals' recollection of their career development (Guindon & Hanna, 2003; Williams et al., 1998; Wiseman, 2003). Results from the current study supported these observations. Nearly half or more of the participants reported experiencing multiple chance events (either concatenated,

independent or both) at some stage in their careers. Most importantly, this study highlights the prevalence and significance of multiple chance events in influencing career decision making. The results of Study 2 suggest that most unplanned events experienced by individuals throughout their career path are more connected than independent.

The influence of multiple concatenated positive events appeared to be greater than single or multiple independent positive events. This provides supporting evidence for the presence of an upward spiral effect where events that are connected to each other result in more profound consequences than initially expected. This effect is consistent with the notion of non-linearity from the Chaos Theory of Careers (Bright & Pryor, 2005). On the other hand it seems that when it comes to negative events, single and multiple events were perceived by individuals to have a similar influence.

Having established distinctive patterns of individuals' self-reported perceptions of multiple chance events, it is appropriate to investigate individuals' perceptions of certain multiple chance events when they rate other people's career decisions. Do we rate other people's chance events in the same manner we rate our own? This was the main aim of Study 3, using the same methodology as Study 2, except this time, participants were asked to rate not their own experiences, but scenarios presented to them.

4. Study 3

4.1. Method

4.1.1. Design
This study used the same design as Study 2. The dependent variables for this study were the perceived influence, randomness, and connectedness of the chance events. Participants were asked to read and rate single and multiple chance events presented in scenarios.

4.1.2. Participants
The same people who participated in Study 2 completed Study 3.

4.1.3. Procedure
Participants continued to complete the scenario test after finishing the questionnaire pack from Study 2.

4.1.4. Materials
Scenario test. This test was developed specifically for this study and consisted of eight scenarios that described the six different categories of chance events. To maintain consistency in the number and types of chance events participants experienced across the scenarios, the chance events under the multiple concatenated and multiple independent conditions combined the two chance events under the single event (S) condition. The same method applied for both the positive and negative outcomes, yielding in total eight scenarios that were only distinctive in terms of the factors that were manipulated.

Special efforts were made to ensure that the characters and content of the scenarios shared consistency in areas that were not intentionally manipulated (e.g. severity of the chance events and the conditions in which these events unfold).

After reading each scenario, participants answered 2–3 questions, depending on the condition. Question 1 asked them to estimate how random or planned were the chance events that the character encountered in the scenario. Question 2 asked participants to rate the overall perceived influence of the chance events on the character's career outcome. Question 3 was a control question and served as a manipulation check for the scenarios with multiple chance events. Specifically, Question 3 asked participants to rate the connectedness of the two events that happened in scenarios C, D, G, and H. All the questions used the same scale as the *chance events recollection survey* with the two extreme ends labelled as totally random/totally planned, no influence/great influence, totally not connected/totally connected.

4.2. Results

The mean influence ratings of the four single chance events in the scenarios (i.e. accident, redundancy, promotion and person of influence) were 4.55 (SD = 0.69), 3.89 (SD = 1.15), 4.24 (SD = 0.94), and 4.35 (SD = 0.70), respectively. The mean difference between the pair of single positive chance events was not significant (t = −.853, p < 0.05), but was significant between the pair of negative chance events however (t = 4.550, p < 0.05). This suggests that it is statistically sound to select one of the positive chance events to use in a 2 × 3 repeated measure within subject analysis (In this case, person of influence was selected.). Separate analysis however has to be conducted on each of the negative chance events (i.e. accident and redundancy) to investigate any differences in the results.

The means and standard deviations (in parentheses) for perception of randomness of the chance events were: single positive 1 (person of influence) M = 2.18 (SD = 1.02); single positive 2 (promotion) M = 3.02 (SD = 1.14); single negative 1 (redundancy) M = 3.03 (SD = 1.37); single negative 2 (accident) M = 1.52 (SD = .86); multiple concatenated positive (person of influence and promotion) M = 2.27 (SD = .99); multiple concatenated negative (redundancy and accident) M = 1.94 (SD = .89); multiple independent positive (person of influence and promotion) M = 2.58 (SD = 1.12); multiple independent negative (redundancy and accident) M = 2.81 (SD = 1.45). The results suggest that all chance events listed in the scenarios

Table 3
Paired samples analysis conducted on level of connectedness between MC and MI.

Events	M	SD	Mean diff.	SD	Sig. (2-tailed)
MCP	3.13	1.31	.36	1.81	.13
MIP	2.77	1.27			
MCN	3.47	1.16	1.71	1.69	.00
MIN	1.76	1.20			

Note.
MCP, multiple concatenated positive events.
MIP, multiple independent positive events.
MCN, multiple concatenated negative events.
MIN, multiple independent negative events.

were perceived by participants to contain a certain degree of randomness (all mean $\leqslant 3$). Hence the chance events selected in this study were considered to be appropriate since participants did see these events as unplanned.

Paired samples analysis was conducted on the perception of connectedness between multiple concatenated (MCP and MCN) and multiple independent events (MIP and MIN) (see Table 3). Multiple concatenated events as illustrated in the scenarios were perceived by participants to be more connected than the multiple independent events. However, the difference between these categories was only significant for the negative condition ($p < .05$).

4.2.1. Main analysis

A 2×3 repeated measure within subject analysis was conducted to compare ratings on perceived influence of chance events across the six conditions (i.e. SP, SN, MCP, MCN, MIP, and MIN). The set of single chance events—person of influence and redundancy was used. The means and standard deviations are presented in Table 4. There was a significant, large simple effect for the influence ratings across the three events (i.e. S, MC, and MI), Wilks' Lambda = .58, $F(2, 60) = 21.75$, $p < .0005$, multivariate $\eta^2 = .42$. Similarly, a significant, large simple effect was also observed for the influence ratings across the positive and negative outcomes, Wilks' Lambda = .64, $F(1, 61) = 34.5$, $p < .0005$, multivariate $\eta^2 = .36$. There was also a significant, large interaction effect for influence across the different events categories and outcomes, Wilks' Lambda = .76, $F(2, 60) = 9.65$, $p < .0005$, multivariate $\eta^2 = .24$.

Single and multiple concatenated chance events that produced both positive and negative career outcomes in the scenarios were perceived by participants as having significantly more influence than multiple independent chance events. This effect was especially profound for chance events that produced negative career outcomes. When negative chance events were portrayed as existing independently in the scenarios, they were perceived to be much less influential on career outcomes than when they were portrayed as connected.

The second analysis used the set of single chance events—accident and person of influence. The means and standard deviations are presented in Table 4. Similar to the first analysis, there were significant, large simple effects for the influence ratings across the three events categories and two types of career outcomes, Wilks' Lambda = .51, $F(2, 60) = 29.08$, $p < .0005$, multivariate $\eta^2 = .49$ and Wilks' Lambda = .73, $F(1, 61) = 22.87$, $p < .0005$, multivariate $\eta^2 = .27$, respectively. A significantly large interaction effect was also observed, Wilks' Lambda = .53, $F(2, 60) = 26.64$, $p < .0005$, multivariate $\eta^2 = .47$. Both analyses reveal a similar general pattern except for a very large increase in the influence ratings for the single negative event-accident. This increase suggests that when single negative chance event like an accident was used in the scenarios, participants tended to rate such an event as having greater impact on the person's career outcomes than when it was combined with redundancy to form the multiple concatenated and independent chance events. This implies that single negative un-

Table 4
Means and standard deviations for perceived influence ratings across the six chance events categories.

Categories	N	M	SD
SP	62	4.35	.70
SN1	62	3.89	1.15
SN2	62	4.55	.69
MCP	62	4.45	.62
MCN	62	4.08	1.05
MIP	62	4.18	.84
Min	62	2.94	1.50

Note.
SP1, person of influence.
SP2, promotion.
SN1, redundancy.
SN2, accident.
MCP and MIP, person of influence + promotion.
MCN and MIN, redundancy + accident.

planned events like an accident that could potentially produce serious physical and psychological injury to the involved party, was perceived by participants to have the greatest influence on one's career outcomes out of all the other categories in the scenarios.

4.3. Conclusions

The three studies confirmed that individuals were able to distinguish the dimensions of influence and control when they are asked to think about chance events. The data from this research also indicated that these dimensions need to be taken into account when seeking to understand the impact of chance events on individuals' thinking and recall. Individuals became increasingly focused on control as the level of influence of chance events on them increases. It appeared that individuals were not focused on control when events have little impact on their careers. High influence chance events were more likely to be recalled than low influence chance events. Confirming the earlier results individuals were most likely to recall events that were high in influence but low in control, since presumably such events were likely to be those over which individuals are most likely to worry. Obvious examples are major injuries as a result of accidents or unexpected retrenchment despite positive work motivation and performance. This research underlines the significance of such events for individuals' careers. In doing so it also confirms the relative importance that the Chaos Theory of Careers (Pryor & Bright, 2007) places on un-planned events on individuals' vocational behavior. Such results are also consistent with Bandura's (1982) observation that the impact of chance events depends upon individuals' capacity to understand and react to such events.

Further the findings from these studies illustrate that chance events frequently do not occur by themselves but are expe-rienced as a series of unanticipated eventualities. Further that these series were more likely to be experienced as linked rather than independent and the impact of linked or concatenated chance events was likely to be more significant than inde-pendent chance events on individuals' impact ratings and recall.

Another major finding was that negative events whether single or linked appeared to have a disproportionate impact on individuals' ratings and recall. Such results confirm earlier theories of Gottfredson' circumscription/compromise theory (Gottfredson, 1996) and Tversky's (1972) elimination by aspects conceptualization, that often career decision making is more about avoiding what is disliked rather attaining what is most preferred. These data provide support for the idea of the potential non-linearity of chance highlighted by the Chaos Theory of Careers, as an important factor in career develop-ment which to date, has not been appropriately addressed empirically. A more general implication out of such a finding is the place of negative events in careers. Most career counseling appears to be based on finding a "successful" career choice. How-ever, the Chaos Theory of Careers' emphasis on complexity implies that negative events accompany many outcomes of voca-tional behavior. If such is the case, then failure will be almost inevitably be part of most career development. However, our counseling experience tells us that fear of failure and its stigma remains major motivators for career decision makers. The area of failure and its benefits as well as its problems remains unexamined in the study of vocational behavior. We believe that failure is too feared by counseling clients and that it is undervalued as an outcome of career decision making in a way analogous to the underrating of null hypothesis outcomes in statistical research.

One of the major consequences of the comparative lack of research on chance events in vocational behavior is a paucity of ways to operationalize terms. The current study's findings are subject to this limitation. The authors attempted to operation-alize variables such as "influence" and "control" through real life scenarios to which the participants in the studies were likely to be able to relate. We did informally show these scenarios to other experienced career counselors and used their feedback to reframe some of the descriptions. The results of the research reported above, in that the dimensions of influence and control were statistically discernable, suggest some validity for these operational efforts. However, this type of interpre-tation of the data could be identified as circular and so should not be pushed too far. Independent validation with a further set of criteria is of course, always desirable.

Moreover the use of scenarios made it difficult to control with any precision the possible differences in levels of influence and control being expressed beyond a very cautious dichotomous categorization of "high" and "low". This was adequate for the aims of this research, however, in "real life" career development there may be less clear cut chance event differences. For example, what difference would the addition of a "neutral' category for influence and control have made to participants' rat-ings in the current research?

In the study of vocational behavior there has been a comparative neglect of the reality of chance events in both the theory and research of vocational behavior. This is slowly, almost reluctantly, changing. Theorists, researchers and counselors have for almost a century emphasized personal control with concepts and expressions such as taking responsibility for decision making, being proactive in career development, implementing one's vocational self-concept, living the dream and getting the work you love, and so on. Occasional voices of dissent (e.g. Roberts, 1977) usually from sociologists or labor market special-ists have been acknowledged but largely ignored. While an emphasis on individual action may be understandable and in many cases very helpful for counseling clients, the reality is that it is not the full story of career development. Any view of careers which does not also include a vision of chance, uncertainty, the limits of control and the partial nature of our knowledge of outcomes, is ultimately inadequate. This was always the case but it is even more so in the 21st century world of work in which complexity, change, and interconnection are accelerating the rate and potential impact of unplanned and unforeseen events. To date the literature of vocational behavior does not represent such an emphasis and those working in the field, need to begin to focus more attention on this perhaps uncomfortable, but nonetheless inescapable challenge.

Appendix A

Example items from Questionnaire 1, Study 1.
Category A: Recall any SINGLE chance event that has resulted in POSITIVE outcome(s) for your career
Example 1
  Event: You returned a lost wallet to the owner
  Outcome: The owner then offered you a job
Example 2
  Event: You suddenly inherited a sum of money from a deceased relative
  Outcome: This provided the financial support for you to make a career change

Category B: Recall any SINGLE chance event that has resulted in NEGATIVE outcome(s) for your career
Example 1
  Event: You bent down to pick up a dollar on the street and hurt your back
  Outcome: As a result, you could not go to work
Example 2
  Event: You contracted a long-term illness
  Outcome: As a result, you had to take time off work
Category C: Recall any series of CLOSELY LINKED chance events that have resulted in POSITIVE outcome(s) for your career
Example 1
  Event 1: You won a writing competition
  Event 2: This led to an unexpected meeting with an editor
  Outcome: As a result of this meeting, you were offered a job
Example 2
  Event 1: You won some money from the lottery
  Event 2: This led to an opportunity for you to set up a small business
  Outcome: As a result, you became a successful businessman
Category D: Recall any series of CLOSELY LINKED chance events that have resulted in NEGATIVE outcome(s) for your career
Example 1
  Event 1: You lost your mobile phone on the way to work
  Event 2: As a result, you missed an important phone call from a potential employer
  Outcome: Because of this, you missed a job opportunity
Example 2
  Event 1: You had a car accident
  Event 2: As a result, you became disabled
  Outcome: Because of this, you had to take time off work
Category E: Recall any two or more unplanned events that happened close together but were NOT RELATED to each other and have resulted in POSITIVE outcome(s) for your career
Example 1
  Event 1: You read an article in the newspaper that described the life of a pottery artist
  Event 2: Two days later, you received some unsolicited leaflets in the mail on pottery classes
  Outcome: You enrolled in the pottery classes and really enjoyed them. You then started your own pottery business which turned out to be a success
Example 2
  Event 1: You won twenty dollars on a scratchy card
  Event 2: When you got home that night, you received a call from your best friend who offered you a new job
  Outcome: Thinking that this could be your lucky break, you accepted the offer and it turned out to be your dream job

Category F: Recall any two or more chance events that happened close together but were NOT RELATED to each other and have resulted in NEGATIVE outcome(s) for your career
Example 1
  Event 1: You received news about the sudden death of a close cousin.
  Event 2: You came home that night and realized that your house had been burgled while you were out
  Outcome: Attending the funeral and dealing with the burglary was a distraction causing you to miss an important deadline at work
Example 2
  Event 1: Out of the sudden, your favourite pet died
  Event 2: You ran out of petrol on the way to an important meeting the following day
  Outcome: As a result, you were irritable at work and offended your boss

Appendix B.   The memory test used in Questionnaire 1.

Write down a very brief description here:

Q1: Have you experienced a single chance event that had a positive impact on your career?
Yes/No   *(If NO, please proceed to Q4)*

Q2: If YES, how often? (Please circle the appropriate answer)
Very rarely   1   2   3   4   5   Very often

Q3: To what extent have such events influenced your career?
No influence   1   2   3   4   5   Great influence

Q4: Rate the likelihood of this happening to you in the future?
Not likely   1   2   3   4   5   Very likely
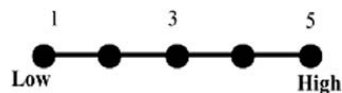
Appendix C.

Sample items from Questionnaire 2.
Practice Question A
　Event: Newton was hit by a falling apple while sitting under a tree
　*Aftermath:* The incident inspired him to discover gravity
(a) How much influence did the event have on the person's career?
　i.e. How much influence did "being hit by the apple" have on Newton's career?

(b) How much control did the person have over the aftermath of the event?
　i.e. How much control did Newton have on what to do after being hit by the apple? Did he have the choice on what to study (high level of control) or must he study gravity (low level of control)?
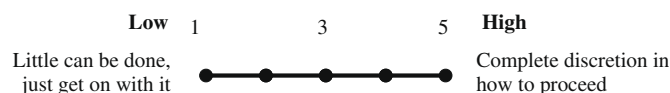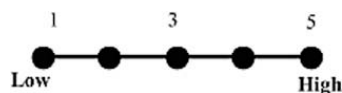

Practice Question B
　Event: John had an accident while working in the kitchen of a restaurant
　Aftermath: He suffered minor injuries and was unable to work for 2 days
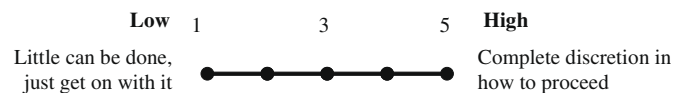(a) How much influence did the event have on the person's career?
　i.e. How much influence did the accident have on John's career?

(b) How much control did the person have over the aftermath of the event?
   i.e. How much control did John have on the consequences of the accident?

Low 1   3   5 **High**

Little can be done,   ●━━●━━●━━●   Complete discretion in
just get on with it   how to proceed

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