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Expectations, Experiences and Career-Related Outcomes of Computer-Assisted Career Guidance Systems

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Abstract

Computer-assisted career guidance systems (CACGS) provide a comprehensive intervention for career exploration and decision-making. Ninety students completed a CACGS bookended by pre and post surveys as part of an undergraduate career class. Results indicated high expectations for CACGS, but lower experience ratings. Interaction with CACGS was associated with increases in student's metacognitive beliefs and experiences associated with career development, with most students progressing in their career decision-making as defined by Cognitive Information Processing theory. When the CACGS experience exceeded expectations, students reported larger gains in their beliefs that they have the knowledge necessary to make a career-decision.

Keywords: computer-assisted career guidance, CACGS, cognitive information processing theory, expectations, CASVE Cycle

Introduction

Computer-assisted career guidance systems (CACGS) help solve career problems (Copeland et al., 2011; Sampson & Osborn, 2015) through improving self-awareness (Peterson et al., 1994), knowledge of information resources (Cerrito et al., 2018; Peterson et al., 1994), decision-making skills (Sampson, 1996), career decision-making self-efficacy (Maples & Luzzo, 2005; Tirpak & Schlosser, 2013), career decidedness (Betz & Turner, 2011), confidence in career decision problem-solving (Tirpak & Schlosser, 2013), and reduced career decision-making difficulties (Gati et al., 2001). CACGS provide an interactive method of career planning, allowing the individual user to assess their strengths, interests, values, and personality in order to improve upon the individual's self-knowledge and self-awareness (Peterson et al., 1994). Through exploration of the self, the CACG programs then can provide pertinent information of career options based upon the individual's assessments, allowing the individual to be better informed and prepared to approach career decisions with more confidence and self-efficacy (Cerrito et al., 2018; Maples & Luzzo, 2005; Peterson et al., 1994; Tirpak & Schlosser, 2013). Not only are the CACGs helpful in providing relevant and personalized information for the client, but they have also been found to be relatively enjoyable to use (Fowkes & McWhirter, 2007), although some emerge more pessimistic afterwards (Tirpak & Schlosser, 2013). Even though CACGS outcomes have been consistently positive, limited research has focused on expectations and experiences of CACGS. Exploring what happens when expectations are or are not met is an area identified as needing attention (Whiston & Rose, 2015).

Client expectations

Expectations are an important predictor of behavior across contexts (Bandura, 1977). For example, individual expectations predict both intentions to use computers (Venkatesh & Davis,

2000) and career choice (Sheu et al., 2010). The technology acceptance model outlined in Venkatesh and Davis (2000) specifies that previous experiences influence attitudes which have lasting effects on future technology use, and this aligns with the social-cognitive model outlined in both Brown et al. (2008) and Brown et al. (2011). Therefore, given that CACGS are an intersection of technology and career, these models predict that it is important to investigate both expectations for and experiences of CACGS because both of these influence important career outcomes.

Understanding client expectations about career interventions allows for targeted interventions (Galassi et al., 1992; Osborn et al., 2003), and for inappropriate expectations to be addressed (Osborn et al., 2003). Several studies inform current knowledge of client expectations about career counseling. Galassi et al. (1992) found that 92 undergraduates seeking career services had specific preferences that differed from their actual career counseling expectations, with the majority not knowing what to expect during or in between sessions or from any tests they might take. In 2003, Osborn et al. examined 55 career counseling clients' expectations who expected CACGS to enhance self-knowledge, expand options knowledge, and increase career options. Whitaker and colleagues (2004) found client expectations about career counseling are malleable when presented with information. In a European sample, Paszkowska-Rogacz (2008) reported that gender, country of origin, and self-reported RIASEC type influence the amount of directiveness clients expect of career counselors. Zysberg (2010) found that effective management of expectations for career counseling predicted greater satisfaction at the conclusion of services in a sample of Israeli undergraduates. Qualitative analysis in Li et al. (2019) indicated that Chinese students expect both guidance and access to relevant information during career counseling.

Given the relative lack of studies that have examined client expectations for career counseling, most of these being over a decade old, and only one aimed specifically at expectations of CACGS, the time to re-examine client expectations for career counseling interventions has come. Additionally, because of the models outlined by the technology acceptance model (Venkatesh & Davis, 2000) and the social-cognitive career theory (Brown et al., 2008; Brown et al., 2011; Sheu et al., 2010), we hypothesize that positive expectations and experiences, and agreement between the two, will be associated with positive career-related outcomes as defined by Cognitive Information Processing theory (CIP; Sampson et al., 2004) and predict intention to use CACGS in the future.

Goals, Purposes and Outcomes of Computer-Assisted Career Guidance Systems

CACGS has been the traditional name used to describe technological programs housing integrated components to improve users' career decision making. Delivered mostly online, CACGS are generally comprised of assessments, link results to career options, provide specific career information (Sampson & Osborn, 2015). The two CACGS used in the present study emphasize matching self-assessment results with educational and career options. SIGI3 (http://www.sigi3.org) helps "explore a range of options based on their personal choices." Bolded on their page is that they help "students and other job seekers create a career plan that's right for them" (Valpar International Corporation, 2016). FOCUS2 (https://www.focus2career.com) also emphasizes a planning process, guiding "your students through a reliable, intuitive career & education decision making model to help them choose majors offered at your college, explore occupations & make informed career decisions." FOCUS2's structure implies the system can benefit students regardless of career planning stage or education by providing structured self-assessments, expanding/narrowing of options for the

individual, and resources for experiential learning opportunities (Career Dimensions Inc, 2014).

Cognitive Information Processing (CIP) Theory

Career interventions are enhanced when used as a practical arm of career theory (Sampson et al., 2014). CIP theory (Sampson et al., 2004) identifies four essential, interrelated (Osborn et al., 2020) components for effective career decisions: knowledge about self and options, decision making skills, and executive processing skills (e.g., overseeing the decision-making process, self-talk). The CASVE Cycle, which represents a sequence of career decision making tasks, includes: Communication (knowing you need to make a decision), Analysis (gathering information about self, options, decision-making, and executive processing), Synthesis (expanding and narrowing options), Valuing (deciding which option is most desired), Execution (taking steps to pursue the option) and revisiting Communication to see if the gap has closed. In a study of career planning classes, Osborn and colleagues (2020) found each of the CASVE Cycle steps had at least one student indicating that was where they were in their decision-making process. That study also demonstrated most moved from earlier (CAS) to latter (VEC) steps, although 24% stayed at the same stage, and 21% moved to an earlier stage.

Previous research (Osborn et al., 2003) used CIP theory to analyze CACGS expectations among clients, but that research is now over a decade old, and only focused on expectations. The purpose of this present study was to examine expectations, experiences and career-related outcomes of using CACGS via CIP theory. As such, research questions addressed how CACGS' expectations and experienced matched, and what happened as a result on specific outcomes, such as student's CIP-related beliefs and feelings, and plans to use CACGS in the future?

Method

Participants

Ninety undergraduate students from a large public Southeastern university aged 18 and above who were enrolled in 6 sections of the career planning course were invited to participate for extra credit. The sample included 31 males (31%) and 59 females (65.6%) with the following ethnic identities: 49 Caucasian (54.5%), 20 African American/Black (22.2%), 15 Hispanic/Latinx (16.7%), 3 Asian (3.3%), 1 American Indian or Alaskan Native (1.1%), 1 Native Hawaiian (1.1%) and 1 individual who did not mark an ethnicity. Ages ranged from 18-37, with 97.8% of individuals falling between 18-23 years of age. The students were primarily seniors (*N* = 40), followed by Juniors (*N* = 22), Sophomores (*N* = 17), and Freshman (*N* = 11).

Instrumentation

All data were collected via self-report survey items. The surveys included a basic demographic form (e.g., ethnicity, age, gender, etc.), Likert Scale items, multiple response items, forced-choice items, and free response items. The Likert Scale survey items were grouped into categories to assess student estimation of their career-related metacognitive knowledge (MK) (4 items), career-related metacognitive experiences (ME) (4 items), and anticipations/expectations (15 items); the MK/ME scale used a rating system from 1 to 5 (Strongly Disagree to Strongly Agree) and the anticipations/expectations surveys used a rating system from 1 to 7 (Strongly Disagree to Strongly Agree). Multiple response items and forced choice items were designed to assess self-reported usage characteristics and preferences (8 items). The career-related metacognition items were combined into scales for this study, initial validation and internal consistency statistics for these scales are reported in the Results section. There were 4 open-ended items that solicited answers for location of CACGS usage, occupations under consideration, primary occupational goal, and anticipated benefits of CACGS usage (i.e., “What do you anticipate the CACGS to do for you?”). Four additional open-ended items were included

in the post-intervention survey how useful/helpful participants found the system, what was liked and disliked, how consistent the results were with their own career theories, and the most important thing learned from using the system.

Both FOCUS2 and SIGI3 are an online, interactive, comprehensive, and self-guided computer program that is designed to assist individuals in making career and academic decisions (Career Dimensions Inc, 2014 ; Valpar International Corporation, 2016). Each CACG has individual assessments focused on a variety of areas that aid in the user in exploring and making decisions associated with their career or major. FOCUS2 has 5 primary self-assessments- work interests, personality, leisure interests, values, and skills, which can be combined to provide the user with career or major options that fit the overlap of their results (Career Dimensions Inc, 2014). Additionally, FOCUS2 provides updated career information including job growth, educational requirements, salary information, and can be personalized for the university using it allowing students to explore majors at their university that best fit their career options (Career Dimensions Inc, 2014). FOCUS2 also provides the user with other tools including action plans/road maps for their career development, a career portfolio that summarizes their results, and a career readiness module based on the NACE competencies (Career Dimensions Inc, 2014). Similar to FOCUS2, SIGI3 provides short self-assessments including values, interests, personality and skills (Valpar International Corporation, 2016). SIGI3 and FOCUS2 both provide multiple ways to explore career or major options, regardless of whether the user has utilized the self-assessments. SIGI3 also provides the user with the option of comparing up to 9 occupations on one page (Valpar International Corporation, 2016). Both CACGs provide the user with multiple methods of self-exploration in association with their career development.

Procedures

At the beginning of the semester, students enrolled in sections of an undergraduate career development course were invited to participate in a research project for extra credit. They completed the demographic form as part of the regular class procedure. The informed consent and link to the online general survey and the pre-survey were on the course website. Students interested in completing the research project clicked on the pre-survey that included the informed consent and a link to the CACGS. As part of the first week of class, students are given a tour of the university career center including the CACGS. To examine uninfluenced expectations, we required the pre-survey to be completed by the morning of the tour. After giving informed consent, students responded to the open-ended question, after which the page forwarded to the pre-test survey. This followed Osborn et al. (2003), who required participants to complete an open-ended question prior to completing a survey so as to elicit unbiased responses.

Interaction with CACGS and completion of a CACGS feedback form is a regular requirement of this undergraduate career development course. After the CACGS assignment was completed, students were prompted to complete the post survey. Similar to Tirpak and Schlosser (2013), we did not impose a requirement that students complete the posttest within a specific amount of time. This was to allow them flexibility to spend as much time as they desired on the CACGS. All the data was then combined into an SPSS (IBM, 2019) database. The Institutional Review Board approved this study.

Research Design and Data Analysis

A cross-sectional, quasi-experimental design was used. The open-ended question about anticipated benefits of CACGS interaction were categorized by thematic analysis into cognitive information processing (Sampson et al., 2004) categories according to the procedure previously used by Osborn et al. (2003). An iterative categorization processes was repeated until all three

raters achieved inter-rater reliability above 95%. Paired sample t-tests compared expectations with actual experiences. Regression analysis examined whether students' experience of CACGS could be predicted by individual expectation items. CACGS' influence, the match between expectations and experiences, and the interaction between CACGS and expectations on career outcomes were analyzed with repeated measures ANOVA with 2 within-subject factors (Career-related Metacognitive Knowledge and Career-related Metacognitive Experience) and one between-subjects factor (Expectations) with two levels (Met Expectations and Did Not Meet Expectations). Data was analyzed using IBM SPSS Version 26 (IBM, 2019). Post-hoc power analysis of repeated measures ANOVA using G*Power 3.1 using $N = 90$, $g = 2$, $\alpha = .05$, $r = .5$ as correlation between measures, an effect size of .25, and 2 measures indicated power greater than .95 for all comparisons. Bivariate correlations were conducted using Pearson correlations, to identify significant correlations. Exploratory factor analysis was utilized to determine acceptability of two composite measures: 1) a meta-cognitive experience (ME) variable constructed out of career process variables (items that assessed feeling of knowing, feeling of confidence, feeling of anxiety, and feeling of satisfaction); and 2) a meta-cognitive knowledge (MK) variable constructed out of CIP pyramid items that asked students to judge their current knowledge of self, knowledge of options, career decision making abilities, and executive processing abilities.

Results

Expectations For Versus Actual Experiences With CACGS

Responses to the open-ended question, "What do you anticipate the CACGS to do for you" ranged from no responses to five ($\underline{M} = 1.87$). Table 1 demonstrates that 249 expectations were classified into all but one pre-determined CIP categories, with the most frequent

expectations for execution (22.1%), executive processing (21.5%), options knowledge (13.5%), and self-knowledge (12.9%). 15 (9.2%) were non-classifiable because they were either lacking a verb, consisted only of a verb, or the raters could not come to agreement on the appropriate category. All expectations were rated at 5 or higher, with the exception of "The computer should tell me what to do" (M = 4.2; SD = 1.8). 37% expected the CACGS to take 31 minutes to an hour, 31% expected 1-2 hours, and 23% expected 0-30 minutes.

As for experiences of CACGS, although students were only required to complete one system, 80% completed both systems, and most (61%) completed the system at home. Other common places included the campus Career Center (25%) and the library (8%). 53% reviewed their results with a career practitioner (e.g., career advisor, career course instructor), and 33% spent 31 minutes to an hour on the CACGS, 29% spent 0-30 minutes, 28% spent 1-2 hours, 7% spent 2-3 hours, and 1% spent more than 3 hours. Those using Focus completed 0-4 sections (M = 1.87), compared to 0-6 sections (M = 2.63) completed by SIG3 users. Most (61%) revisited the CACGS two to three times, with others used the system once (24%), four to five times (9%), or six or more times (3%). Students varied in the amount of time that had passed since they completed the CACGS and the follow up survey, ranging from less than a day (n= 11; 12.2%) to two weeks (n = 53; 58.9%). Other time lapses included 1 day (n = 2; 2.2%); 2 days (n= 4, 4.4%); 3 days (n = 1; 1.1%), 4 days (n = 3; 3.3%) and a week (n = 14; 15.6%). Multiple ANOVAs were conducted to determine whether significant differences existed in either pre-test or post-test outcomes measures between groups based on these variables (i.e., number of times CACGS revisited, amount of time spent on CACGS, where individuals used the CACGS, whether results were reviewed with a career counselor), and no differences were found.

All experience means were lower than expectation means, with the exception of the item,

"The computer will be easy to use," which saw an increase (M = 4.5, SD = 1.6). Students liked how the CACGS combined assessments, provided instant feedback, and were easy to navigate, but disliked the user interface, limitations of major options, and that too many options were overwhelming. When asked how consistent the CACGS outcomes were with their own thoughts, students said the CACGS suggested options they were already considering, options that were consistent with their Holland code, and that inconsistencies that occurred disappeared after re-taking the CACGS assessments. The most important learning outcomes from the CACGS were the variety of jobs associated with a specific major, variety of resources and information provided, and information regarding the proper steps for getting a job in the field. Juniors rated overall usefulness of the CACGS significantly higher than any other group [$F(3, 85) = 3.49$, $p = .019$], with a mean of 6.05 (SD = .95) and all other groups' means at 5.54 or below.

Relationship between CACGS Expectations and Experiences

Paired t-tests revealed student summed anticipations for the system (M = 84.21, SD = 11.02) were significantly higher than their summed experience of the system (M = 79.10, SD = 15.40), $t(89) = 2.95$, $p < .01$, suggesting that students' overall experience was less positive than they anticipated. Backward regression indicated that only two anticipation questions (i.e., "the CACGS will tell me what career I should do" (Beta = .319, $p < .01$) and "Overall, I think the CACGS will be helpful to my decision making" (Beta = .214, $p < .05$)) predicted overall student self-reported experience of the system [$r = .458$, $F(2, 87) = 9.76$, $p < .001$].

Several significant, weak to moderate correlations were found between specific expectations and actual experiences of CACGS. These included being more aware of and able to monitor and control self-talk ($r = .40$, $p < .01$), being told what career they should do ($r = .34$, $p < .01$), expanding career options ($r = .29$, $p < .01$), narrowing career options ($r = .21$, $p < .05$), and

confirmation of career direction ($r = .24$, $p <. 05$). Those who were looking forward to using the CACGS were more likely to report enjoyment using the CACGS ($r = .25$, $p < .05$), and those who expected using the CACGS would be helpful overall in their career decision were more likely to report that experience ($r = .23$, $p < .05$). Finally, total pre-CACGS anticipations and post-CACGS experiences were related ($r = .52$, $p < .03$).

Composite Meta-cognition Variable Creation

Exploratory factor analysis was conducted using principle component analysis. Data for 8 items were included in this analysis and both pre and post intervention data for these items were collapsed to increase the sample size. Bartlett's Test of Sphericity rejected the null hypothesis, which suggested these data are appropriate for scale reduction. Based on theoretical connections between the constructs of MK and ME (Efklides, 2006), we assumed the components would be correlated and conducted oblique rotation using promax rotation with Kaiser Normalization. The analysis converged in 3 iterations to create the simplest structure achievable: two factors with eigenvalues greater than 1 ($\lambda_1 = 4.24$; $\lambda_2 = 1.04$) and a scree plot identified a two-factor solution, accounting for 66% of the total variance; Factor 1 (MK) accounted for 52.97% of the variance, while Factor 2 (ME) accounted for 12.99% of the variance. Table 2 reports the rotated pattern and structure coefficients for each item. Reliability analysis suggested good reliability for the MK items ($\alpha = .865$) while the ME items had acceptable reliability ($\alpha = .763$).

Influence on Career Outcomes When Expectations and Experiences are Met/Not Met

Multivariate analysis was conducted with a repeated-measures ANOVA to examine the influence of meeting expectations on career-related metacognitive knowledge (MK) and career-related metacognitive experiences (ME). Box's Test of Equality of Covariance Matrices was non-significant, which suggests the multivariate analysis in the MANOVA was valid.

Additionally, Levene's Test was not significant for any variable, which also suggests model assumptions were met. Finally, skewness and kurtosis of both pre and post ME and MK scores were within the range of ±1, which suggest the data were normally distributed.

We found a main effect of Treatment [$F(2, 87) = 18.1$, $p < .001$), and a significant interaction of Expectations x Treatment [$F(2, 87) = 4.1$, $p < .05$), but no significant differences were observed in mean metacognitive experiences between students whose expectations were met and students whose expectations were not met. These results suggest that the use of CACGS in and of themselves influence career-related metacognition, and Expectations interacted with CACGS to influence some outcomes, but whether students' expectations were met do not influence career-related metacognition. Box's Test of Equality of Covariance Matrices was non-significant, therefore multivariate analysis results were valid. When expectations were met, self-reported growth in the composite CIP domains (i.e., self-knowledge, options knowledge, decision making skills, and ability to control self-talk), composite career process, and executive processing was larger. See Table 3 for statistics of all pre and post measures split by expectations. Levene's Test of Equality of Error Variance was not significant for any measure; thus, all statistics reported are those for which sphericity was assumed.

Influence of CACGS on Career Outcome Variables and Future Plans

The multivariate aspect of repeated measures ANOVA indicated a main effect of CACGS, $F(2, 87) = 18.1$, $p < .001$), with univariate analyses indicating students' scores were significantly higher post CACGS use on all outcome variables (see Table 3). Specifically, students reported significant gains in their metacognitive knowledge (i.e., beliefs about their knowledge) that monitors whether they have the necessary and sufficient knowledge to make a career decision. They also reported significant positive changes in their affective response to

their plan to achieve their career goals (i.e., career-related metacognitive experience). For example, the students reported greater confidence in their plan after the intervention.

Placement in the CASVE decision-making cycle at pretest revealed 55 students (61.1%) placed themselves in the early decision making steps (CAS), and 35 (38.9) in the latter decision making stages (VEC). At post-test, 37 (41.1%) were in CAS, and 53 (58.9%) were in VEC [$X2$ (1, $N = 90$) = 3.72, $p < .05$]. Specifically, 27 students in the CAS stage at pre-test remained in the CAS stage afterwards, and 28 progressed to the VEC stage. 10 students in the VEC stage prior to CACGS use moved to the CAS stage, and 25 remained in the VEC stage after CACGS use. Overall, 28 (31.1%) students moved to an earlier stage in the cycle, 24 (26.7%) remained in the same stage, and 38 (42.2%) moved to a later stage. Of note, each step in CASVE at both testing times had a minimum of eight to a maximum of 23 students.

For future plans, students were equally divided (46.7%) between not needing additional help and needing brief drop-in meetings with a career advisor, and only two (6.7%) needed individual career counseling over a longer period of time. When asked if they would use CACGS in future career concerns, 22% said definitely yes, 37% said probably, 27% said maybe, 12% probably not, and none said, “definitely not.”

Discussion

This study sought to extend research on what students expect from and experience with CACGS, and to explore what happens when expectations are or are not met. Students’ free responses about expectations showed the most common categories of expectations were execution, executive processing, options knowledge, and self-knowledge. This confirmed but differed slightly from earlier findings (Osborn et al., 2003) that clients’ most common expectations were self-knowledge, options knowledge, and increasing career options. Execution

involves acting on the decision, and executive processing is concerned with the overall personal management of the career decision (Sampson et al., 2004).

Students consistently rated their CACGS' expectations extremely high across categories, which differed from the Osborn et al. (2003) study which showed greater variability among expectations. Perhaps in the current society where technology is relied on to provide information and advice for every topic imaginable, participants in the present study believed the CACGS could and should deliver on each survey item. This trend might align with the results of Paszkowska-Rogacz (2008) and Li et al. (2019) because the results in this study also suggested students tend to desire CACGS to be highly directive. For example, it is possible that the terms "assisted" and "guidance" might have triggered today's students to think of the CACGS as a career "gps," providing a personalized career plan detailing how to reach their individual career goal. Perhaps it is time for a new name that incorporates the terms planning and system. The two bylines of the systems used in the present study were "Education and Career Planning Software" (Sigi3), and "Career and Education Planning System" (Focus2). A third popular system, Kuder, describes itself as a "Career Planning System" (https://www.kuder.com/solutions/kuder-career-planning-system/). In addition, most systems are offered in a web-based venue, so perhaps a new name of "Online Career Planning System" would be more appropriately descriptive. Plus, the current emphasis on comprehensive individual career assessment and planning has the potential to create more individualized plans and next steps.

CACGS prove to be an effective intervention for all the career outcome variables, confirming previous studies that CACGS use improves self-knowledge (Peterson et al., 1994), options knowledge (Cerrito et al., 2018), decision-making skills (Sampson, 1996), and confidence (Tirpak & Schlosser, 2013). CACGS use resulted in gains for CIP-related constructs,

similar to a previous study using an undergraduate career course as the intervention (Osborn et al., 2020), which also found similar improvements in CIP pyramid scores and movement patterns across the CASVE Cycle stages. Although most students moved from earlier to later stages of decision-making via the CASVE Cycle, several moved to earlier stages or stayed the same. Following CACGS use, most students expressed increases in the belief they have acquired knowledge to enable career development, similar to outcomes from other career interventions such as a brief drop-in career advising model (Osborn et al., 2016) and a career planning class (Osborn et al., 2020). Additionally, most reported increases in readiness to make the next step on their own or with brief assistance, aligning with CIP theory that states that most individuals can address their career needs successfully with a self-directed or brief-assisted model (Osborn et al., 2016; Sampson et al., 2004).

Exploring what happens when expectations are or are not met was a key question of the present study. We hypothesized that positive expectations and experiences, and agreement between the two, would be associated with positive career-related outcomes as defined by Cognitive Information Processing theory (CIP; Sampson et al., 2004) and would predict intention to use CACGS in the future. When expectations were met, students reported increases in overall CIP pyramid scores and overall career process variables, supporting our hypothesis. However, when exploring individual elements, only executive processing was influenced by meeting expectations. A possible reason for this lack of influence is that individual variables were measured by one item. Another possibility is that when expectations were not met, students remained stuck in the process. Still, that executive processing could be enhanced by meeting expectations is an important finding. CIP theory (Sampson et al., 2004) describes executive processing as the command center, or how an individual manages the overall career decision

making and problem solving process. Helping an individual increase in their capability of and personal agency with making a career decision is a chief aim of CIP theory.

Implications for Theory and Practice

Five key implications for CIP theory (Sampson et al., 2004), emerged from our findings. First, CACGS as a specific career intervention positively influenced CIP domains and CASVE Cycle movement, and most students' next steps can occur in a self-directed or brief service delivery approach. Second, CIP domain elements are significantly related, re-affirming CIP theory assumptions (Sampson et al., 2004) and theory validity (Osborn et al., 2020). Third, the CASVE Cycle might not follow a linear process, in that movement might be forward, backward, stay the same, and jump stages (at least by the time post-testing occurs) in response to interventions. Fourth, meeting CACGS' expectations influences CIP domains. Fifth, clients' expectations were present in all but one free response CIP category, and high for every Likert-scale CIP category, suggesting CIP theory can be used to organize CACGS' expectations.

Three key implications are noted for career practitioners. First, practitioners can be confident in the efficaciousness of CACGS as an intervention, as multiple positive outcomes were noted. Second, the importance of orientation to CACGS by a career practitioner is suggested. In our present study when students were not provided an orientation to CACGs, expectations were high, sometimes misdirected, and almost always at odds with actual CACGS experience. Previous research (Whitaker et al., 2004) has shown that unrealistic client expectations for career counseling can be changed when they are presented with accurate information. Practitioners can ask how CACGS might help with a client's career decision. CIP theory can provide a manageable context for this conversation. A third implication for practitioners is specific to post CACGS use. In terms of next steps, most students expressed that

they could either proceed on their own or they needed a few brief interactions with a career practitioner. Career practitioners might consider having a list of guidelines or orientation points for students to consider as they engage in more self-directed interventions. Also, given that students expressed expectations in the "Execution" category, which suggests a personalized plan, career practitioners might address this during CACGS orientation, and then integrating the CACGS experience into an individual career plan post CACGS use.

Results of this study also has implications for career course instructors. Incorporating a CACG assignment has many positive career-related outcomes. Similar to the recommendations for practitioners, career course instructors might consider providing an overview of CACGs' purposes, and how a CACGS' components might address specific student career needs (e.g., the assessment section might enhance self-knowledge). Instructors might also have students reflect on their CACGS results and use those in building a career action plan. Finally, career course instructors are encouraged to identify course and activity or assignment goals and to track on and evaluate outcomes, so as to determine the efficaciousness and relative value of specific course interventions. We found CIP theory provided a useful framework for organizing these goals.

Limitations and Implications for Future Research

Limitations of the present study included sample, pre-post instrumentation, and possible confounding variables. Though our sample consisted of multiple sections of an undergraduate career course across different semesters, it was limited to one university, limiting generalizability to other universities and populations. While the sample size was large (N = 90), a larger sample could have detected a main effect of whether expectations were met, and may have shown an interaction between the main effect and expectations. In addition, because the CACGS intervention was one of over 50 interventions in that course, it is impossible to interpret changes

as a result of CACGS use, or the match between CACGS' expectations and experiences, alone. In addition, the pre-post tests used in this study, although used in previous studies, and demonstrating acceptable levels of reliability, have not been validated statistically for construct validity. Despite these limitations, significant results were found and can lay the groundwork for future research. For example, what pre-existing variables (e.g., personality, dysfunctional career thoughts, career readiness, mental health concerns) influence individuals' expectations for and use of CACGS? What role does orientation to a CACGS play on expectations? Do the findings of this present study extend beyond the classroom to clients? The CIP pyramid and process items continue to yield strong alphas and factors analysis supports further examination of this as a potential measure of metacognitive knowledge and experience.

Conclusion

Meeting expectations for CACGS outcomes positively influenced CIP-related self-rated skills of as self-knowledge, options knowledge, career decision-making skills, and executive processing skills, and on CASVE Cycle progression as well. Users believe that the CACGS are useful in helping with their career decision. Theoretical relationships among CIP pyramid of information processing components (self-knowledge, options knowledge, career decision-making skills, and self-talk) were confirmed. High expectations for what CACGS can and cannot do, as well as the benefits found when client expectations are met, suggest the importance of orientation to and processing results after CACGS. Ultimately, study outcomes provide support for using CACGS with students to enhance their career decision-making and problem solving process.

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Table 1
Response Categories Descriptions and Examples

Category/ N & Percentage	Description	Free Response Example
Self-Knowledge Development (N = 21; 12.9%)	Information pertaining to the development of personal knowledge through life experiences.	Learn more about myself Learning my passion for a career
Options Knowledge (N = 22; 13.5%)	Any information related to the world of work or education. The building of occupational knowledge structures. Schema development; organizing the world of work	Help with career opportunities Provide me with info that will help me discover what kind of career to pursue in the future
Executive Processing (N = 35; 21.5%)	Includes general problem-solving skills, including task/goal orientation and approach skills. Monitor and control of the task. Learner strategies.	Help with career development Learn how to do great in an interview
Communication (N = 2; 1.2%)	Becoming aware that a problem/gap exists; includes being in touch with feelings. Also encompasses knowledge that a good choice has been made or that I need to make a good choice; awareness of a gap between existing lack of indecision and a desire level of decidedness. Becoming in touch the tension between the real and the ideal.	See if my major is correct for me
Analysis 0% (N = 0; %)	Understanding the causal components of the gap. Why does the gap exist? How do I remove it?	
Synthesis (Elaboration) (N = 13; 8%)	Help with identifying/expanding potential alternatives.	Match me with appropriate careers to my interests Match values, priorities, and personality with an occupational field
Synthesis (Crystallization) (N = 3; 1.8%)	Help with narrowing down options under consideration.	Help narrow down potential options Help guide me narrow down options for my career

Valuing (N = 5; 3.1%)	Assessing alternatives in relation to one's value system; also involves prioritization of alternatives. Personalized criteria emerge (beyond that which can be measure and sorted by the computer).	Help me prioritize and choose my career Help me figure out where the best career is for me
Execution (N = 36; 22.1%)	Information pertaining to the development of a plan or strategies	Job placement Resume planning Creating a personalized plan
Computer Effect (N = 11; 6.7%)	Comments on how interacting with the computer will be.	Help me Improve computer aptitude
Not Classifiable (N = 15; 9.2%)	For responses that cannot be placed in any other category. Incomplete fragmented statements or thoughts. No objects or word or statements that could fit into two or more categories. Off-the-wall statements	Overall understand others views

Table 2

Results of an Exploratory Factor Analysis of Career-related Outcome Meta-cognition Items

Career-related Outcome Metacognition Item	Pattern Matrix		Structure Matrix	
	1	2	1	2
Factor 1: Career-related Meta-cognitive Knowledge				
How do you rate your current:				
Knowledge of your values, interests, and skills	**0.869**	-0.078	0.824	0.421
Knowledge of your options	**0.757**	0.124	0.828	0.559
Career decision making skills	**0.782**	0.165	0.877	0.615
Awareness of and ability to monitor/control your self-talk	**0.903**	-0.133	0.827	0.387
Factor 2: Career-related Meta-cognitive Experience				
How satisfied are you with your current career decision? (REV)	0.226	**0.568**	0.553	0.699
I feel anxious about my career concern (REV)	0.224	**0.548**	0.539	0.677
I feel I know the next steps to attain my career goal	-0.137	**0.926**	0.395	0.847
I feel confident that I can make the next steps to attain my career goal	-0.075	**0.86**	0.42	0.817

Note. N = 180. The extraction method was principal axis factoring with an oblique (promax with Kaiser normalization) rotation. Factor loadings in the Pattern Matrix above . 3 are in bold. Reverse-scored items are denoted with (REV).

Table 3

Descriptive Statistics for Repeated Measures ANOVA Split by Expectations

Variable	Group	Pre		Post		ANOVA			
		Mean	*SD*	Mean	*SD*	*F*	*effect*	*df*	η^2
MK	Met Expectations	13.28	3.06	16.23	2.93	6.42*	Int	1, 88	0.07
	Did Not Meet	12.92	3.04	14.06	3.11				
	Total	13.08	3.04	15.02	3.2	32.78**	T	1, 88	0.27
ME	Met Expectations	14.13	3	15.77	2.87	0.005	Int	1, 88	0
	Did Not Meet	12.22	3.24	14.82	2.94				
	Total	13.62	3.15	15.24	2.93	20.72**	T	1, 88	0.19

Note. N = 90. ANOVA = analysis of variance; MK = career-related metacognitive knowledge; ME = career-related metacognitive experience; Int = Interaction ; T = Treatment.

*$p < .05$. **$p < .001$.