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A Review of Undergraduate Mentoring Programs

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This review summarizes published studies on undergraduate mentoring programs from 2008 to 2012. Twenty studies met the inclusion criteria, which included empirical research on formal mentoring programs with undergraduate students as mentees or mentors. Each study was assessed based on limitations identified in two earlier reviews of the mentoring literature: definition, theory, and methods. Results from this review indicate minimal progress has been made in these three areas. However, every study included the functions of mentoring, and most studies were guided by a theory or a conceptual framework. Aspects of social validity, a construct not previously examined, were assessed and found to be present in 50% of studies. Finally, information on primary mentoring program components, another dimension not previously examined, was absent in 75% of studies, making replication difficult. Future research needs to specify program components, employ rigorous research designs to guide evidence-based practice in undergraduate mentoring, and assess social validity.

Keywords: academic performance, mentoring, retention, student integration, undergraduates

Research on mentoring has not kept pace with the proliferation of undergraduate mentoring programs (UMPs) on college campuses (Crisp & Cruz, 2009; Jacobi, 1991). The purpose of establishing UMPs can vary, but they generally aim to strengthen student engagement and relationship building in order to improve academic performance and college retention, and/or assist with career planning (Nora & Crisp, 2007). However, without methodically rigorous and valid research, it is unknown if mentoring programs are achieving their intended outcomes. With universities heavily investing both financial and human resources in mentoring, it is prudent that research guide the development and continuous improvements in mentoring programs for undergraduate students. This article is the third review of studies that examine the impact of UMPs. This review specifically considers undergraduate students as mentees or mentors since undergraduates can function in both these roles. I begin by summarizing the first two reviews and then indicate the additional contributions of the current review.

Jacobi (1991) conducted the first review of the undergraduate mentoring literature, which highlighted three key shortcomings: a lack of a consensus on a clear, concise definition of mentoring, theoretical deficiencies, and various methodological weaknesses. One contribution of her review was identifying four theories in higher education in which mentoring could be integrated (involvement with learning, academic and social integration, social support, and development support). Within these theories, Jacobi presented research components (independent, mediating, and dependent variables) as well as the key functional aspect of mentoring. Based on her review of the literature, she offered recommendations for future research. One of these recommendations was the need to include simple descriptive information, such as the number of students who access mentoring, the nature of their mentoring partnerships, and the characteristics of both the mentors and mentees. Additionally, to understand how mentoring leads to academic success, Jacobi recommended that evaluations assess the effectiveness of formal mentoring programs using more rigorous research designs and providing basic theoretical analysis. This type of information, she concluded, would advance both the science and practice of mentoring.

Following Jacobi's (1991) review, Crisp and Cruz (2009) reviewed the mentoring literature over a 17-year period (from 1990 through summer, 2007). This review included mentoring to graduate students and mentoring programs abroad. Crisp and Cruz's review was also broader in scope in that it examined theoretical perspectives of mentoring from not only the education literature, but also from business and psychology. In their review of 42 empirical studies, they found that, since Jacobi's review, more mentoring studies were published that focused on different types of students, such as women, minorities, first-generation, and LGBT individuals. Although the breadth of mentees suggested progress, most of the studies had the same methodological limitations as the earlier studies, which threatened the internal validity and generalizability of the findings. Crisp and Cruz recommended that theory expand to include underpinnings of critical race and feminist theories as well as theories from other fields. These authors reiterated the need for a clear definition of mentoring, having found over 50 definitions in their review. Additional recommendations centered on internal validity issues, such as utilization of longitudinal designs and standard instruments and external validity issues, such as studying broader mentoring programs in multiple settings. Their findings also highlight the need for a better understanding of mentoring programs, including the characteristics of the participants.

The value of this current review is fivefold. First, it extends the literature by reviewing undergraduate mentoring studies from 2008 through 2012, which is the time period since the Crisp and Cruz (2009) study. Issues of definition, theory, and methods highlighted in the earlier studies are examined. Second, a classification system for assessing evidence-based interventions (Jackson, 2009) is used to indicate the methodological rigor of each study. Third, this review assesses the function or role of the mentor in each study, using the categories advanced by Nora and Crisp (2007). Fourth, this review considers aspects of social validity in the studies. Finally, key mentoring program components are identified across the studies, such as mentor–mentee ratios. This analysis reveals that considerable

progress is still needed in order to advance knowledge and practice of UMPs. Recommendations from this study are identified to enable evidence-based improvements in UMPs.

Method

Multiple databases, including ESBCO Host, Education Full Text, ERIC, and SOCIndex were searched from their inception through December, 2012. "Mentoring AND (University or College)" were the key words used in the search. A total of 1,445 studies were initially identified. The title and abstract of each article were reviewed to determine appropriateness of inclusion for this article. Through this process, two prior mentoring reviews were discovered, with the last review concluding in 2007. As such, the sampling frame was narrowed to only focus on studies published since January, 2008.

Additionally, many publications were excluded because their focus was not on undergraduates as a mentee or mentor; rather, the focus was on mentoring graduate students or faculty. Other articles were excluded if the mentoring program was too general (mentoring was only one component of the intervention), simply descriptive (no analysis), focused on internship experiences, and not face-to-face (i.e., electronic mentoring programs). Mentoring programs were included where there were undergraduates who served as mentors, even if the mentees were K-12 students, since the aim of the review is to understand better the impact of mentoring on undergraduates, both in their role as a mentor or mentee. All aspects of the sampling frame reflect the overarching aim of this review, which is to understand better the impact of mentoring on undergraduate students. A total of 20 studies are included, 6 of which are international studies.

The data presented in this article are organized into three tables. To classify the methodological rigor of the studies, the Levels of Evidence-Based Intervention Effectiveness (LEBIE) that was developed by Jackson (2009) was used; the levels are presented in Table 1. LEBIE was developed to assess the methodological rigor of social service interventions and was adapted for use assessing UMPs in this study. Using this classification system is appropriate as mentoring is an intervention designed to affect various student-related outcomes. This classification system was developed subsequent to the last mentoring review, which did not use a classification system to evaluate research methods. Thus, the use of this system provides a baseline for assessing future scholarship in this area. LEBIE includes the following five levels: Level 1 = *Superior Intervention*, Level 2 = *Effective Intervention*, Level 3 = *Efficacious Intervention*, Level 4 = *Emerging Intervention*, and Level 5 = *Concerning Intervention*. Table 1 also includes a tally of how many articles were assessed at each level, and these results are discussed in more detail in the Results section.

Table 2 is a summary of frameworks, methods, and findings of undergraduate mentoring empirical studies. Table 3 identifies the participants in the study, the function of mentoring, and selected mentoring program components. In each case, categories relevant to the table were developed based on concepts in the literature (described in more detail in the Results section).

Past reviews on mentoring (Crisp & Cruz, 2009; Jacobi, 1991) did not specifically assess social validity. Social validity was originally defined as a subjective

(Text continues on p. 380.)

TABLE 1

Levels of evidence-based intervention effectiveness

Evidence-based intervention level	Study design	Evidence of effectiveness	Reviewed articles meeting criteria
Level 1: Superior	Experimental design: randomization with equivalent control and comparison group	Intervention is superior to an appropriate comparison program. Sustained effect reported at follow-up	0
Level 2: Effective	Experimental design: randomization with equivalent control or comparison group	Intervention is proven to be significantly better than a placebo control group or evidence supporting that the intervention is better than an appropriate comparison intervention	0
Level 3: Efficacious	Quasi-experimental design: nonequivalent control group/ nonrandomization	Intervention efficacy over the placebo control group or evidence supporting that the intervention is comparable to or better than an appropriate comparison intervention	5
Level 4: Emerging	Nonexperimental design: single group pretest–posttest	Intervention demonstrates some degree of positive change over time	4
Level 5: Concerning	Any	No evidence of change or change in the opposite direction putting participants more at risk	11

Note. The source for the LEBIE (Levels of Evidence-Based Intervention Effectiveness) classification system is K. F. Jackson (2009).

TABLE 2

Frameworks, methods, and findings in undergraduate mentoring empirical studies (2008–2012)

Author and year	Theory or conceptual framework	Methods and *N*	Dependent variable	Findings
Amaral and Vala (2009)	Passive versus active learning (Benware & Deci, 1984)	*N* = 6,439 mentor posttest *Limited to chemistry course LEBIE Scale: 3	Academic performance and retention/ persistence (mentor)	Serving as a peer mentor generated higher grades in subsequent chemistry courses than other "underprepared" students than the other "prepared" students Social validity: Absent
Bernal, Alemán, and Garavito (2009)	Boarderlands paradigm (Anzaldúa, 1987)	*N* = 68 written reflections; 11 interviews; 8 in focus group *No comparison group *Limited to service learning course LEBIE Scale: 5	Latina/o identity	Tensions with identity (not fitting in at home or on campus); confidence rather than shame; ownership of university identity Social validity: Present
Bullen, Farruggia, Gomez, Hevaisbi, and Mahmood (2010)	NA	*N* = 28 mentors and 30 mentees prepost test; focus group *N* = 6 *No comparison group *Limited to preservice teaching students LEBIE Scale: 4	Mentoring relationship and career certainty	Mentoring had a positive impact on mentors' development of the values, skills, relationships, and knowledge required to satisfy teaching standards in New Zealand Social validity: Present
Fox, Stevenson, Connelly, Duff, and Dunlop (2010)	Student approaches to learning (SAL) paradigms (Duff & McKinstry, 2007)	*N* = 25 mentors and 24 mentees prepost test; comparison *N* = 135 *Limited to accounting students LEBIE Scale: 3	Academic performance	Freshmen students participating in mentoring demonstrated stronger academic performance in comparison with those who did not participate in the mentoring program. No difference among third-year peer mentors in their academic performance with their comparison group Social validity: Present

(continued)

TABLE 2 (continued)

Author and year	Theory or conceptual framework	Methods and *N*	Dependent variable	Findings
Gannon and Maher (2012)	Social capital and social networks (Bozionelos, 2006; Hezlett & Gibson, 2007; Singh, Ragins, & Tharenaou, 2009)	Posttest for mentors and mentees (only percent responses provided); focus group *N* = 12 *No comparison group *Limited to hospitality and tourism school LEBIE Scale: 5	Program utilization and perception of satisfaction and outcomes	Mentees not fully aware of mentoring benefits. Ninety percent of alumni mentors wanted to continue serving in the role. Social validity: Absent
Goff (2011)	Shared learning community (Tinto, 1995)	*N* = 1,474 posttest; 1,192 pretest *No comparison group *Limited to biology course *Lack reliable survey instruments LEBIE Scale: 5	Academic performance, mentee transition, and selection of biology major	Positive impact on final grades in introductory biology course (attending 3 or more mentoring sessions); no impact on transitioning to university or selection of biology as a major Social validity: Present
Grabowski, Heely, and Brindley (2008)	NA	*N* = 453 mentees posttest *No comparison group *Limited to faculty research labs *Lack reliable survey instruments LEBIE Scale: 5	Retention/persistence (mentee) and student engagement	Positive correlation between participation in the faculty mentor undergraduate research program and retention. The number of 1st-year students engaged in project has remained constant over 4 years Social validity: Absent
Hall and Jaugietis (2011)	Social integration (Tinto, 1975) & social support (Pearson, 1990)	*N* = 41 mentee interviews; *N* = 1,228 mentee posttest; *N* = 156; mentor posttest *No comparison group LEBIE Scale: 5	Retention/persistence (mentee)	Positive impact on student persistence decisions; perceived helpfulness by mentor (across various dimensions) increased over time; mentors reported benefits including enhanced skills Social validity: Present

(continued)

TABLE 2 (continued)

Author and year	Theory or conceptual framework	Methods and *N*	Dependent variable	Findings
Holland, Major, and Orvis (2012)	Capitalization (Judge & Hurst, 2007)	*N* = 214 mentees posttest *No comparison groups LEBIE Scale: 5	Satisfaction, affective commitment, and involvement with major; willingness to mentor others; capitalization (making the most out of one's circumstances)	Lower satisfaction with major and commitment to major by minorities; additional positive impacts of capitalization and peer mentoring; no effect on involvement with major; willingness to mentor others with higher GPA and with peer mentoring (larger effect size with peer mentoring than capitalization) Social validity: Absent
Hu and Ma (2010)	Social integration (Tinto 1975, 1987, 1993)	*N* = 334 mentee pretest–posttest *No comparison group LEBIE Scale: 4	Retention/persistence (mentee)	Having an assigned mentor who the mentee turned to for support and encouragement (and this was perceived as important by the mentee) was positively related to probability of persisting in college Social validity: Present
Jones and Goble (2012)	NA	*N* = 24 focus group *No comparison group *Limited to education majors LEBIE Scale: 5	Effective mentoring components	Identified key components for creating and improving effective mentoring partnerships for students with intellectual disabilities Social validity: Absent
Lee, Germain, Lawrence, and Marshall (2010)	College diversity (Gurin, 1999 and others); Reducing intergroup predjudice (Allport, 1954)	*N* = 256 mentors and 261 comparison pretest–posttest; 33 interviews *Lack reliable survey instruments LEBIE Scale: 3	Mentor commitment; prejudice reduction; understanding of diversity	91% commitment; more likely to report increased listening and greater tolerance Social validity: Present

(continued)

TABLE 2 (continued)

Author and year	Theory or conceptual framework	Methods and *N*	Dependent variable	Findings
Mekolichick and Gibbs (2012)	Cultural capital (Bourdieu, 1973; Stuber, 2011); Social integration (Tinto 1975, 1993)	*N* = 265 mentees pretest–posttest *Limited to student presenting at regional sociological meetings LEBIE Scale: 3	Mentor expectations and experiences	Mentoring expectations and experiences differ between continuing generation (value networking opportunity) and first-generation college students (approach is more instrumental, value is job credential) Social validity: Present
Morales (2010)	Cultural discontinuity (Calda & Bankston, 1998 and others): Social capital (Coleman, 1988, 1990); Transnational (Dicker, 2001; Pessar, 1995)	*N* = 15 mentee interviews *No comparison group *Limited to Dominican males LEBIE Scale 5	Academic performance and retention/ persistence (mentee)	Mentors proved to be valuable social capital for male Dominican Americans by providing insider academic information, legitimizing mentees' academic and professional goals, and transformed mentees' immigrant experiences into academic inspiration. Social validity: Present
O'Brien, Llamas, and Stevens (2012)	NA	*N* = 77 mentees posttest *No comparison group *Limited to education students LEBIE Scale: 5	Mentoring relationship; program satisfaction; intent to complete program	Mentoring increased mentee belonging and engagement Social validity: Absent

(continued)

TABLE 2 (continued)

Author and year	Theory or conceptual framework	Methods and *N*	Dependent variable	Findings
Putsche, Storrs, Lewis, and Haylett (2008)	Feminist and network models (Benishek, Bieschke, Park, & Slattery, 2004)	*N* = 15 mentors and 14 mentees participant observations, interviews; *N* = 23 mentees pretest *No comparison group LEBIE Scale: 5	Mentoring program development and implementation	Program success depends on appropriate staffing, matching, and continuous communication re: mentee needs Social validity: Present
Smith (2008)	NA	*N* = 124 mentees postsurvey *No comparison group *Limited to seven courses in liberal arts college *Lack reliable survey instruments LEBIE Scale: 4	Mentoring relationship	Improved perception of learning benefits from mentoring with those who interacted more with mentors; improved mentoring performance when repeated in second semester Social validity: Absent
Torres and Hernandez (2009)	College retention models (Bean, 1980, 1983; Tinto, 1993)	*N* = 541, Yr1; 339, Yr2; 227, Yr3; 171, Yr4 posttest *No comparison group *Limited to Latina/o students LEBIE Scale: 4	Institutional commitment; satisfaction with faculty; academic integration; cultural affinity; encouragement	Positive impact of an advisor/mentor on Latino students' institutional commitment, satisfaction with faculty, academic integration, cultural affinity, and encouragement Social validity: Absent

(continued)

TABLE 2 (continued)

Author and year	Theory or conceptual framework	Methods and *N*	Dependent variable	Findings
Vannest et al. (2008)	Resiliency fostering strategies (Brooks, 1994)	*N* = 27 mentors and 16 mentees observations & e-mail exchanges *No comparison group *Limited to preservice teachers LEBIE Scale: 5	Inappropriate classroom behaviors (mentee)	Mentoring relationships with certain vulnerable populations (such as students at risk of or with emotional/behavioral disorders) may have mixed results (no change, positive behavior changes, and negative behavior changes) Social validity: Present
Yaffe, Bender, and Sechrest (2012)	NA	*N* = 423 mentees; 73 comparison posttest *Limited to biology majors and medical students *Lack reliable survey instruments LEBIE Scale: 3	Undergraduate research experiences and career trajectories	More students participating in the undergraduate research program (than from the comparison group) indicated their mentors had a great influence on their career choices Social validity: Absent

Note. Asterisks are used to flag selected methodological limitations.

TABLE 3

Key operational features of undergraduate mentoring programs

Authors and year	Participants		Function	Selected mentoring program components				
	Mentors	Mentees		Ratio	Mandatory or voluntary	Compensation	Frequency/ duration	Mentoring support
Amaral and Vala (2009)	Previously "underprepared" peer mentors leading small group sections	Undergraduate "underprepared" chemistry students	Academic subject knowledge support	1:4–6	Voluntary	Chemistry credit	Weekly	Mentor
Bernal et al. (2009)	Latino/a undergraduates	Latino/a schoolchildren	Psychological/ emotional support; role model	NA	Mandatory once in course (service learning requirement)	Course credit	NA	In context of course
Bullen et al. Mahmood (2010)	University undergraduates, primarily preservice teachers	Ninth-grade students in MATES Junior program	Academic subject knowledge support; role model	1:1–2	Voluntary	No	NA	Mentor
Fox et al. Dunlop (2010)	Third-year accountancy undergraduates (equal to seniors in the U.S.)	First-year accountancy undergraduates	Academic subject knowledge support	1:3	Voluntary	No	Once a week for 6 weeks	Mentor

(continued)

TABLE 3 (continued)

Authors and year	Participants		Function	Selected mentoring program components				
	Mentors	Mentees		Ratio	Mandatory or voluntary	Compensation	Frequency/ duration	Mentoring support
Gannon and Maher (2012)	Alumni	Undergraduate seniors	Goal setting and career paths	1:2–3	Mandatory	2-semester course	Monthly	2 briefing sessions with mentors; 1 briefing with mentee; coordinator served as problem solver
Goff (2011)	Peers in introductory biology course	Peers in introductory biology course	Academic subject knowledge support	NA	Voluntary	No	5 peer mentoring sessions/ semester	Peer mentoring sessions
Grabowski et al. (2008)	Faculty running research labs	Students receiving exposure to research	Academic subject knowledge support	NA	Voluntary	Research job payment and course credit	75–150 hours per semester	Seven "cohort" sessions for students
Hall and Jaugietis (2011)	Seniors	Freshmen	Psychological/ emotional support	1:6–10	Voluntary; 15% join; of these 40% complete	No	First 7 weeks	Mentor training web-based discussion tools
Holland et al. (2012)	Peers in undergraduate STEM programs	Undergraduate students in STEM fields	Psychological/ emotional support; academic subject knowledge support; role model	NA	Voluntary	Extra credit for participation	NA	NA

(continued)

TABLE 3 (continued)

Authors and year	Participants		Function	Selected mentoring program components				
	Mentors	Mentees		Ratio	Mandatory or voluntary	Compensation	Frequency/ duration	Mentoring support
Hu and Ma (2010)	NA	Students in Washington State Achievers (WSA) program (families at or below 35% of average state income)	Psychological/ emotional support; goal setting and career planning; academic subject knowledge support; role model	NA	Mandatory	No	1–9 contacts per year	NA
Jones and Goble (2012)	Undergraduates in general and special education majors	Intellectual Disability (ID) undergrads	Psychological/ emotional support; academic subject knowledge support	1:1	Voluntary	Service Learning with academic credit	1–3 hours/ week	1–3 hours training
Lee et al. (2010)	College students	At-risk adolescent girls	Psychological/ emotional support; role model	NA	Mandatory once in course	Course credit	4 hours monthly 1:1; 2 hours weekly group; 2× per semester structured activities	Required 2-semester course for mentors; group facilitation

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TABLE 3 (continued)

Authors and year	Participants		Function	Selected mentoring program components				
	Mentors	Mentees		Ratio	Mandatory or voluntary	Compensation	Frequency/ duration	Mentoring support
Mekolichick and Gibbs (2012)	University researchers	First and continuing generation undergraduates presenting sociology research (mostly juniors and seniors)	Goal setting and career planning; academic subject knowledge support; role model	NA	Voluntary	No	NA	NA
Morales (2010)	University faculty and staff; high school teachers	Undergraduate Dominican males	Psychological/ emotional support; academic subject knowledge support; role model	8:15	Voluntary	No	NA	NA
O'Brien et al. (2012)	Peer mentors	First-year education students	Psychological/ emotional support; academic subject knowledge support; role model	NA	Voluntary	No	6 weeks	Training for mentors and ongoing support via handbook and program staff
Putsche, Storrs, Lewis, and Haylett (2008)	Advanced undergraduates, graduate students, staff, faculty	Undergraduate women	Psychological/ emotional support; role model	NA	Voluntary	No	NA	Mentor and mentee

(continued)

TABLE 3 (continued)

Authors and year	Participants		Function	Selected mentoring program components				
	Mentors	Mentees		Ratio	Mandatory or voluntary	Compensation	Frequency/ duration	Mentoring support
Smith (2008)	Peer tutors (who previously took the course)	Peer students	Academic subject knowledge support	1:18–33	Voluntary	Course credit	NA	2.5 hours training and ongoing support
Torres and Hernandez (2009)	Student identified mentors/advisors in survey	Latino/a students	Psychological/ emotional support; academic subject knowledge support	NA	Voluntary	No	NA	NA
Vannest et al. (2008)	Undergraduate preservice teachers	At-risk youth with emotional/ behavioral disorders	Psychological/ emotional support	1:1	Voluntary	1/3 of course grade	Weekly 2-hour sessions; daily e-mail	Mentor
Yaffe, Bender, and Sechrest (2012)	University researchers	Undergraduate biology majors and medical school graduates (comparison group)	Academic subject knowledge support; role model	NA	Voluntary	No	NA	NA

Note. The four functions comprising the mentoring concept are derived from the work of Nora and Crisp (2007).

measure in behavioral intervention research that focused on whether the intervention goals, procedures, and effects are perceived as socially relevant by the individual receiving the services or those who care about the individual (Wolf, 1978). Over time, this construct has been applied beyond community and behavioral interventions (Francisco & Butterfoss, 2007). Eamon (2008) provided a four-part operationalization of social validity, calling for "[a] the establishment of socially relevant goals; [b] demonstration of meaningful change; [c] use of acceptable, appropriate, and feasible interventions; and [d] maintenance and generalization of intervention gains" (p. 328). The operationalizations can involve subjective and objective measures, which include and extend beyond reported satisfaction with an intervention.

None of the studies in this review explicitly sought to assess social validity. As a result, it is not possible to determine from the studies whether all four of Eamon's criteria (2008) were met. The first and third criteria, socially relevant goals and use of acceptable, appropriate, and feasible interventions, respectively, were coded as present if the following were evident in the study: (a) focus groups, individual interviews, or surveys with mentors and/or mentees centered on the perceived value and impact of the mentoring intervention and/or (b) culturally sensitive interventions, such as the use of Latino/a mentors with Latino/a mentees. Eamon's second and fourth criteria, demonstration of meaningful change and maintenance and generalization of intervention gains, respectively, are contingent on experimental or quasi-experimental methods, which are classified in this review through the LEBIE scale. Criteria two and four also involve additional assessments from the point of view of the participants or other key stakeholders. Since few of the studies involve sufficiently rigorous methods to be assessed with the second and fourth criteria, only the first and third criteria were used. As a result, this review is only assessing two aspects of social validity (Eamon, 2008). Even a partial measure of social validity serves to advance this construct in the context of UMPs.

Also, past reviews on mentoring (Crisp & Cruz, 2009; Jacobi, 1991) found multiple definitions of mentoring, and these authors also called for more specificity on mentoring program features. The articles reviewed here also varied considerably in definitions of mentoring. While there was variability in the reporting on program features, the functional categories of mentoring from Nora and Crisp (2007) were still able to be used to summarize the role(s) of the mentors. These functions include (a) psychological or emotional support, (b) support for goal setting and choosing a career path, (c) academic subject knowledge support aimed at advancing a student's knowledge relevant to their chosen field, and (d) specification of a role model.

Results

Use of Theory

Over the past 5 years, limited academic progress has been made on shortcomings identified in the previous reviews of UMPs. One limitation identified in the previous two reviews on mentoring was a lack of theory guiding the research (Crisp & Cruz, 2009; Jacobi, 1991). The second column of Table 2 indicates that

70% (n = 14) of the undergraduate mentoring studies were guided by a theory or conceptual framework. These theories include cultural capital (Bourdieu, 1973), shared learning (Tinto, 1995), social capital and social networks (Bozionelos, 2006; Hezlett & Gibson, 2007; Singh et al., 2009), social integration (Bean 1980; Tinto, 1975, 1987, 1993), social supports (Pearson, 1990), boarderlands paradigm (Anzaldúa, 1987), feminist and network models (Benishek et al., 2004), capitalization (Judge & Hurst, 2007), and student approaches to learning (Duff & McKinstry, 2007), as well as others. The mix of theories reflects the diversity in the range of the outcome measures being examined (discussed below), but does stand as one indicator of progress in the literature. The theory that is most often applied to undergraduate mentoring studies is Tinto's social integration theory, which postulates that students who are integrated into the campus environment, both within and outside of the classroom, are more apt to persist and not depart from the university without graduating.

Threats to Validity

Although the use of theory is a positive dimension of the articles reviewed, there are still important limitations in the methods employed. In column 3 of Table 2, summaries of the methods employed, the size of the population studied, selected methodological issues, and the LEBIE classification score are presented. Common threats to internal validity noted include the lack of control or comparison groups and the lack of reliable measurement instruments. Specifically, 75% (n = 15) of the studies did not include a control or comparison group and 25% (n = 5) did not administer survey instruments with reliable scores. These factors limit the ability to know if research results are due to the intervention or other factors.

Common threats to external validity noted in Table 2 included small sample size, a single geographical location, and a narrowly focused program. For example, 30% (n = 6) of the studies had less than 40 mentors or mentees. Although there is no precise cutoff for a sample size being large enough to not be a threat to internal validity, 40 is used here, as it is a minimal sample size frequently used in the research methods literature (e.g., Goodhue, Lewis, & Thompson, 2006). Also, 85% (n = 17) of the studies were conducted at one university, and 55% (n = 11) of the studies were limited to a single course, major, or college. All these factors limit the generalizability of research results from one location or population to others.

Using the LEBIE classification scale to assess methodological rigor for evidence-based practice, not one of the mentoring studies met either of the top two classification levels (superior or effective), since none employed an experimental design. The highest classification achieved in assessing the 20 mentoring studies was a Level 3 or efficacious. There were five studies (25%) that achieved this classification by using a nonrandomized control or comparison group. Four studies (20%) fell in the Level 4 or emerging category. The majority of studies (55%, n = 11) received the lowest possible classification, Level 5 or concerning. The classification results are primarily because these studies only collected data at one point in time on mentees and/or mentors participating in the mentoring program with no comparison group. As such, there is minimal evidence of

positive change to mentors or mentees that is the result of mentoring (despite most studies reporting positive impacts of mentoring). In summary, the methodological concerns noted in past reviews remain evident in current undergraduate mentoring research.

Past research reviews did not list the dependent variables for each study in the review, but did address the reliance on perceptions as outcome measures (Jacobi, 1991). As can be seen in column 4 in Table 2, most undergraduate mentoring programs focused on more subjective measures (such as satisfaction or perception of mentoring relationship) as proxy measures for predicting academic and other outcomes. Even seemingly objective measures, such as GPA or retention, still involve administrative judgment. Of the studies in this review, 60% (n = 12) used more subjective measures, whereas 40% (n = 8) used more objective measures. Two studies used both types of outcome measures. The use of both subjective and objective outcome measures has the greatest promise for achieving internal, external, and social validity.

Column 5 in Table 2 summarizes the findings from the 20 undergraduate mentoring studies. Considering the methodological limitations previously discussed, findings in these studies need to be viewed with caution, even though all the studies do report some positive effects associated with mentoring. The final column in Table 2 also identifies if aspects of social validity were present. As noted earlier, social validity was not addressed in the two prior research reviews of studies evaluating mentoring programs and none of these studies examined in this review explicitly sought to measure social validity. If aspects of social validity were present, it meant that the researchers gathered information from the mentors and mentees on their perceptions of the goals, process, and effects of the mentoring intervention (beyond just satisfaction) and reported culturally sensitive interventions. Fifty percent (n = 10) of the studies did take into account aspects of social validity, including mentor or mentee perceptions. Although Jacobi (1991) was critical of a reliance on participant perceptions of mentoring, this review identifies participant perception as an element of social validity and a positive finding that can be combined with more objective measures.

Operational Features of Studies

At the conclusion of both prior research reviews on mentoring (Crisp & Cruz, 2009; Jacobi, 1991), the authors recommended that future scholarship specify key programmatic information. In particular, Jacobi (1991) called for a listing of descriptive information, such as the number of students who have access to mentors, the nature of their relationship, and other relevant program features. These types of program features were still missing 18 years later when Crisp and Cruz (2009) published their review of the mentoring literature. In a 2007 study, Nora and Crisp did provide a multidimensional framework on mentoring functions. In Table 3, a detailed review is provided of key operational features of the 20 UMPs in this review, in part utilizing the mentoring functions highlighted by Nora and Crisp. Additionally, Table 3 identifies who are the mentors and mentees and other operational components outlined by Hall and Jaugietis (2011). In providing this information, Table 3 allows for the first comprehensive review of operational features of mentoring programs.

In most (70%, $n = 14$) of the studies, mentors were undergraduates. Although creating mentoring opportunity for college students can be beneficial (Amaral & Vala, 2009; Bullen et al., 2010), past research also points to the need to create a structure of accountability to safeguard against inconsistency and early termination of undergraduate students who serve as mentors (Lee et al., 2010). The remaining mentors included faculty, staff, high school teachers, or alumni. The mentees in the studies were primarily (75%, $n = 15$) undergraduate students who were chosen on the basis of a specific attribute, such as an underprepared chemistry student, a first-year accountancy student, a senior, or a woman. Mentees who were not undergraduates were elementary, middle, or high school youth who also were chosen on the basis of attributes, such as a Latino/a, at-risk adolescent girls, or at-risk youth with emotional/behavioral challenges. In the Crisp and Cruz (2009) review, growth in mentoring for special populations was noted, and this current review also includes two studies (5%) in which the mentors were from special populations (underprepared and Latino/a) and nine studies (45%) where mentees were from special populations, such as first-generation college students, individuals with intellectual disabilities, Latinos/as, and individuals from low-income families.

Definitions Versus Functional Aspects of Mentoring

The two previous reviews of mentoring studies (Crisp & Cruz, 2009; Jacobi, 1991) addressed the multiple definitions used in these studies. The "who, what, and why" were generally included in each of the mentoring definitions, but varied. For example, Blackwell (1989) considered the "who" for a mentor as "persons of superior rank, special achievements, and prestige" (p. 9) whereas Lester and Johnson (1981) considered the "who" as "an older person and a younger person" (p. 119). Additionally, Blackwell identified the "what" as "instruct, counsel, guide, and facilitate" whereas Lester and Johnson considered the "what" as "modeling behavior and extended dialogue." Finally, Blackwell considered the "why" as "intellectual and/or career development" whereas Lester and Johnson identified the "why" as "learning." This lack of consistency in a mentoring definition also applies to studies reviewed here.

Rather than focus on different mentoring definitions, however, the four functional aspects of mentoring as advanced by Nora and Crisp (2007) are identified for each of the 20 studies in Table 3. Sixty percent ($n = 12$) of the studies had their mentors serve in multiple functions. The function most often provided by a mentor was academic support (70%, $n = 14$), followed by psychosocial or emotional support (55%, $n = 11$) and by serving as a role model (50%, $n = 10$). The function least used by a mentor was goal setting and helping with career paths (15%, $n = 3$). Although defining terms is important, the range of functional aspects of programs suggests that, rather than seeking a single definition for mentoring, it is most important for mentoring research to specify the functional aspects of the program.

Program Components

Table 3 lists five mentoring program components that are derived from Hall and Jaugietis (2011), as discussed earlier in the Method section. The first program

component is the mentor–mentee ratio. As indicated in Table 3, there is wide variation in this ratio (ranging from 1:1 to 1:30) and more than half of all studies (55%, $n = 11$) did not include this critical information. The second program component is whether or not mentoring is voluntary or mandatory. The majority (80%, $n = 16$) of the programs were voluntary, with mandatory mentoring either included as part of a course requirement or as part of a scholarship program. The third program component is whether compensation (e.g., financial or as part of a mentor's grade) is involved. No students who served as mentors received financial compensation. Student mentors, however, received course credit for serving in the role in 40% ($n = 8$) of the studies.

The fourth program component is the frequency in meeting and duration of the mentor–mentee partnership. There was a wide variation in reporting of this information. For example, in 55% ($n = 11$) of the studies, no information was provided on the frequency of meeting, and in 65% ($n = 13$) of the studies, no information was provided on the duration of the mentor–mentee partnership. When reporting was provided, the shortest duration for a mentoring partnership was 6 weeks, and the longest was 1 year. With regard to the frequency of meeting, some studies provided specific information about the frequency of meetings (e.g., weekly), but were not specific about the amount of time per meeting. Other studies provided information about a specific time frame, such as meeting 75–150 hours over a semester. Without using the same units, such as hours per week per semester, it is not possible to compare the programs on this important component.

The fifth program component is mentoring support, either through training, resource material, the structure of a course, or ongoing supervision for either the mentor or mentee. In 30% ($n = 6$) of the studies, there was no indication of support for the mentor–mentee partnership. In only two studies, mentors and mentees both received some type of support, though the support was not specified. More often, mentors received support, which was identified in 50% ($n = 10$) of the cases. However, specifics about the types of support were not provided to assess and compare across studies.

Discussion

Two past reviews cited deficiencies in mentoring research due to absence of a guiding theory, use of multiple definitions, and methodological limitations (Crisp & Cruz, 2009; Jacobi, 1991). Over the course of the past 5 years, progress has been made with respect to the use of theory or conceptual frameworks. Tinto's (1975, 1987, 1993) theory of student integration is the one most often cited when the dependent variable was student retention or persistence. Because various outcome measures have been studied when focusing on mentoring as an intervention, a wide variation of theories also have been used. Looking to the future, a single guiding theory would be inappropriate given the range of outcome measures in undergraduate mentoring programs.

Although multiple definitions of mentoring were previously seen in reviews as a limitation, this article has presented evidence to suggest that some of the problems with a lack of a common definition of mentoring can be addressed by specifying the functions of the mentoring role. This review is the first to classify the literature based on the various possible mentoring functions, as identified by Nora

and Crisp (2007). By doing so, it was determined that UMPs generally serve more than one function, and those that are employed with greatest frequency are academic support, psychosocial support, and role modeling. The fourth mentoring function, goal setting and helping with career paths, was indicated in a limited number of studies. This outcome might be related to the fact that the mentees were mostly college freshmen, and several of the mentoring programs were limited in scope to a college course or a short duration in time. The function of mentoring is likely to differ depending on who is the mentee. College freshmen have different needs than college seniors, for example, and these needs will be reflected in the functional roles of the mentors. Determining the function of mentoring also has practical implications in that (a) it provides clarity for administrators who are developing and determining the scope of a mentoring program, (b) it enables researchers to make more accurate comparisons across mentoring programs, and (c) it provides clarity for faculty, staff, and students who participate in mentoring programs.

The methodological limitations in mentoring research remain vast. By applying the LEBIE classification scale, the findings illustrate that the majority of mentoring studies received the lowest possible score, meaning that there was no conclusive evidence that mentoring programs had an impact on the desired outcomes. Why then do mentoring programs proliferate on college campuses? This question has not been answered in other reviews (Crisp & Cruz, 2009; Jacobi, 1991) and is a worthy inquiry for future research. Certainly, university administrators, faculty, and staff are eager to provide support and services to facilitate student success, but it appears from the literature that development of mentoring programs has not been guided by empirical evidence.

Perhaps the proliferation of mentoring programs is based more on aspects of social validity whereby the value is determined by participant perceptions. However, aspects of social validity have not been given any prominence in literature reviews. In fact, relying on perceptions of mentees and mentors has been cited as a methodological limitation (Jacobi, 1991). Also, the LEBIE classification scale does not give any explicit consideration to social validity in its classification, though experimental and quasi-experimental methods are needed to determine some aspects of social validity. By considering social validity, this article documents research that points toward a combination of subjective and objective measures, taking into account the perspectives of mentees and mentors. Overall, experimental and quasi-experimental research designs are needed in mentoring research and social validity should also be valued in research as it is in practice.

Operationally, mentoring programs vary considerably. For example, how can a one-to-one mentoring program compare to a mentoring program with a ratio of 1:30? This is the first review that attempts to identify key components across UMPs. What is evident from this review is that information on these components is not commonly reported in studies. When information is reported on key operational components, the diversity of these features defies any simple classification scheme. Moreover, failing to specify these key operational components, such as training, seriously limits any comparison across studies and any efforts to replicate findings. For example, knowing that 70% of mentors in these studies were undergraduates and knowing from past literature that peer mentors need a structure

for accountability, studies need to address the training and other support components available to mentors and mentees.

Since 2008, there were only 20 empirical studies identified on undergraduate mentoring, and none achieved high levels of methodological rigor. Prior reviews were also critical of the caliber of research methods. Why haven't there been more rigorous mentoring studies over the past four decades? It is certainly the case that a true randomized experiment would present ethical concerns since some students would be denied mentors who wanted them and others would have mentors imposed. Nonetheless, there can be naturally occurring experiments where mentoring programs are rolled out in successive waves or where a lottery is involved to allocate scarce resources. Additionally, improved quasi-experimental designs are possible, as seen in this review in 25% of the studies.

Limitations

There were several limitations in this review of UMPs. First, it is possible that additional empirical studies exist on undergraduate mentoring programs but were not discovered under the methods employed in this article. As it cannot be determined if the 20 studies selected are representative of the full population, this lack of information should be considered a limitation of the study. Second, studies that were only descriptive were excluded from this article, as it would not be possible to assess levels of evidence and other factors. A limitation, however, is that some descriptive studies of mentor programs might contain valuable information on mentoring program components.

Third, only one person (the author) classified the studies. Studies in this review were classified in three ways: according to mentoring function, whether social validity was present, and levels within LEBIE. In the measurement of mentoring function, the accuracy of the classification depends on the quality of the program description by the authors in each study. There may have been additional mentoring functions in the studies but not described by the researchers.

In the measurement of social validity, the accuracy of the classification depends on whether the authors in each study reported on methods through which the perceptions of the mentor and mentee were considered in the analysis. Both Type 1 and Type 2 errors are possible. That is, some authors may have reported interactions classified in this review as social validity that were in fact superficial (Type 1) and other authors may have attended to social validity but not reported it in their study (Type 2). Moreover, none of the studies explicitly sought to assess social validity. Furthermore, in introducing the construct of social validity to research on UMPs, a judgment is being made that perspectives of the mentors and mentees, as well as other aspects of social validity, matter. Classifying the studies according to the LEBIE 5-level scale was least likely to be subject to error, as all articles reviewed included a Method section with relevant information. Still, the potential for misclassification is a final limitation.

Conclusions and Implications

Although there have been some advances in undergraduate mentoring, the research has not kept pace with the proliferation of mentoring programs. This review has implications for improving future research and practice.

The most important finding in this review is the need for more rigorous research designs in studies of UMPs. Researchers should continually strive to improve internal and external validity through use of control and/or comparison groups, valid instruments, multiple research sites, pretests–posttests, and other such rigorous research methods and designs. Otherwise, conclusive evidence on the effectiveness of undergraduate mentoring remains limited.

Additionally, as this review illustrates, not all UMPs are the same. Future research on UMPs needs to specify key operational features of the program. These include characteristics of the mentors and mentees, functions of the mentoring role, mentor–mentee ratio, frequency and duration of mentoring meetings, expected duration of mentoring commitment, types and extent of training and other support, compensation/rewards, and whether the program is mandatory or voluntary. This information is important for comparisons across programs and assessment of impacts.

Finally, researchers should consider assessing social validity in their studies. Rather than seeing more subjective participant views as a methodological flaw, gathering data on participant perceptions and the influence on program improvement are important elements in understanding the relevance of the mentoring process on those who matter the most. Social validity needs to be integrated with measures that are internally and externally valid in order to improve evidence-based practice.

For university administrators, there is a need to create partnerships with researchers to achieve higher levels of evidence-based practice. At a minimum, university administrators should be clear about the goals of the mentoring program, the function or role of the mentors, the measures that will be used, and collect baseline and ongoing data to evaluate if program objectives are being met. University administrators should not only be guided by the scholarly literature but also understand the limitations and work to employ best practices. Finally, university administrators should use internal data to guide continuous improvement in program operations.

For individuals who serve in the role of mentor for undergraduates, which could include faculty and staff as well as students, this analysis reinforces the importance of distinguishing among the range of applicable mentoring functions. These include academic support, psychological/emotional support, goal setting, career paths, and role modeling. This way, faculty, staff, and students can enact their mentoring roles with the potential for greater clarity and effectiveness. Both mentors and mentees can also benefit from improved training and other support within each of these functional categories. Additionally, mentors and mentees can play valuable roles contributing to the continuous improvement of mentoring programs by providing information needed for evaluation. Beyond mentoring roles, implications for faculty and staff include joining with administrators in ensuring well-structured and appropriately evaluated programs.

In an era of increasingly constrained resources and strategic challenges in higher education, evidence-based research will be even more important. Effective mentoring programs have a potential to play valuable roles in higher education, but this potential can only be realized through improvements in research and practice.

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