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Psi Chi functions as a federation of chapters located at over 1,150 senior colleges and universities around the world. The Psi Chi Central Office is located in Chattanooga, Tennessee. A Board of Directors, composed of psychology faculty who are Psi Chi members and who are elected by the chapters, guides the affairs of the Organization and sets policy with the approval of the chapters.

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The twofold purpose of the Psi Chi Journal of Psychological Research is to foster and reward the scholarly efforts of psychology students as well as to provide them with a valuable learning experience. The articles published in the Journal represent the work of undergraduates, graduate students, and faculty; the Journal is dedicated to increasing its scope and relevance by accepting and involving diverse people of varied racial, ethnic, gender identity, sexual orientation, religious, and social class backgrounds, among many others. To further support authors and enhance Journal visibility, articles are now available in the PsycINFO®, EBSCO®, Crossref®, and Google Scholar® databases. In 2016, the Journal also became open access (i.e., free online to all readers and authors) to broaden the dissemination of research across the psychological science community.

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Invited Editorial: How to Prepare Theses and Dissertations for Publication in Peer-Reviewed Journals

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ABSTRACT. Although research and psychological literacy are pivotal components to one’s education in psychology, the generation of scientific literature is often a novel topic to students. The purpose of this article is to demystify and outline expectations for the publication process in Psi Chi Journal of Psychological Research and beyond, particularly for students who plan to submit capstone research projects (e.g., master’s theses, dissertations) for publication. There are a few important differences between theses and peer-reviewed articles, including the role of the committee or editorial board, the manuscript revision process, and the length of the manuscript. Students also need to be aware of typical review timelines, possible decisions, and expectations for correspondence with editorial boards. Finally, students must consider the ethical implications of submitting Electronic Theses and Dissertations for publication in peer-review journals.

Differences Between Theses and Peer-Reviewed Journal Articles

There are a few important differences between theses and peer-reviewed articles including the role of the committee or Editorial Board, the manuscript revision process, and the length of the final manuscript. Capstone projects (e.g., senior honors project, master’s thesis, doctoral dissertation) are typically conducted under the guidance and support of a group of faculty members within a student’s department or institution, often referred to as a committee. The committee members will have expertise in the topic of interest, the methodology, the population being studied, and/or other aspects of the project. At times, the student may recruit faculty members from other institutions who are known for their expertise in a given area.

For capstone projects, the student generally has a personal working relationship with the committee members and meets with them regularly to conceptualize, execute, and write up the findings from the research project. The committee members will provide feedback on theory, methodology, results, and other components of the project over the course of two or more academic semesters. The
responsibility of the committee is to promote the student’s academic and professional growth during a pivotal time in academic training. Hence, they are likely to be available for student questions and concerns, and may demonstrate personal interest or investment in the student’s project.

Following completion of the project, committee members may encourage the student to submit the work for publication in an empirical journal. To be considered for publication in a journal, the manuscript must first be peer reviewed. The peer-review process advances objectivity in the field and ensures that high-quality research is disseminated to the public (APA, 2010a). When a student submits a manuscript to a journal for consideration, an editorial board will begin the peer-review process to assess the quality and rigor of the research, the suitability for that journal, and potential contributions to the field.

The editorial board typically includes an editor, associate (and/or managing) editor, and numerous reviewers with wide-ranging areas of expertise. For each manuscript submission, the editor or associate editor will recruit two to four reviewers who have known expertise in the manuscript’s theory, topic area, or methodology. The role of the reviewers is to (a) read the manuscript with a critical lens, (b) provide feedback for authors that summarizes strengths and concerns pertaining to the research, and (c) determine whether the dissemination of the manuscript would advance knowledge in the field.

The nature of the peer-review process is quite different from the committee’s role in a few key areas. First, the student will not know the assigned reviewers, and the reviewers will not know who submitted the work for publication (often considered “blind review” or “masked review”). Second, the role of a journal’s editorial board and reviewers differs from the role of a committee; rather than ensuring that a student has met requirements for graduation in one’s program, the editorial board and reviewers serve as gatekeepers for research disseminated to the public (Hawkins, Kimball, & Ives, 2013). Third, journal reviewers provide feedback after the research project is complete, rather than while the project is being conducted. Their feedback is often based on the rationale provided in the introduction, the methods, the statistical analyses, or how findings are interpreted. Reviewers may identify “fatal flaws” in the research that cannot be fixed or addressed without executing the research project a second time (Domenech Rodriguez, 2012; Evans et al., 2018). When this is the case, the likelihood of publication is decreased because findings may be resting on shaky scientific foundations.

It is also essential for student authors to recognize that the document submitted to an empirical journal will be substantially different from the thesis or dissertation document (APA, 2010b; Tribe & Tunariu, 2017). Journal articles are typically much more concise than theses or dissertations due to page restrictions of submitted manuscripts; page limits of 25 or 35 pages are common for empirical journal articles. Authors are thus required to focus only on the essential literature, research question(s), and findings. In addition to making the document more concise, authors have the additional challenge of updating the literature review and discussion section to include articles that have been published since completion of the project. Of note, journals may not only have page limitations, but many have restrictive word counts or a maximum number of tables and figures. Be sure to pay attention to each journal’s requirements. Do not assume that they are all the same.

The Review Process Itself: Timelines and Decisions

Due to the nature of the peer-review process, it is important for students to be aware of typical timelines for reviews and what to expect following a submission. Timelines are specific to each journal, and some journals provide time estimates on their website detailing the review process. For example, it takes approximately six to eight weeks for Psi Chi Journal’s editorial board to thoroughly review and arrive at a consensus for each manuscript. Some decisions may come sooner or later, depending on the time of the year, the number of incoming publications, availability of reviewers, or the journal.

Although it can be difficult for students to anxiously await a decision during this period, the editorial board always appreciates patience from those who submitted manuscripts for consideration. At times, manuscripts may take longer. It may depend on the journal, but it is generally appropriate for authors to contact the editorial board after three to four months with no news. Students are encouraged to consult with faculty regarding this decision. Typically, a simple and polite e-mail asking for an update on the review process is all that is needed.

Following the initial review, the editorial board will send an e-mail to the author stating the decision. The decision may be any of the following: Reject, Revise and Resubmit, Conditional
Acceptance, or Acceptance. Some journals publicize their acceptance and rejection rates to help inform potential authors. The more competitive or highly ranked the journal, the more selective they must be due to increasing numbers of submissions. In Psi Chi Journal, approximately 30% of submitted manuscripts are eventually accepted.

Rejection
A rejection can arise after an initial review by the editor, which typically occurs within a week after the author(s) submits the manuscript. This decision, referred to as a “desk rejection,” can occur if the editor identifies serious methodological flaws or concludes that the manuscript is not the best fit for the journal (APA, 2010b). When this occurs, authors will typically receive feedback directly from the editor that provides context for their decision. A rejection can also occur at any point during the peer-review process if the assigned reviewers identify serious flaws or question the manuscript’s intellectual contribution to the field. In this case, the editorial board will send a decision letter to the author(s) that includes feedback from the associate editor and two to four reviewers.

Rejections are common, so students are encouraged not to take the decision personally and to meet with a faculty member to go through the editorial board’s feedback. From there, discuss whether your team is supportive of the suggested changes and whether your team has the desire to submit the research to another journal. The references section may be a good starting point for potential journals to target next. Often, manuscripts are submitted to multiple journals before reaching acceptance (Shaikh, 2016). Do not become disheartened!

Revise and Resubmit
If the editorial board identifies some concerns regarding the manuscript that could be addressed through revisions, the editor may make a “Revise and Resubmit” decision. In this case, the editor will outline the concerns in the decision letter and invite the author(s) to submit a revised version of the manuscript. Typically, the editor will request to receive the revision within 30 to 60 days from the date that the initial decision letter is delivered. This decision means the editorial team is interested in the research, and is willing to work with the author(s) to make the manuscript suitable for publication.

Following a decision of Revise and Resubmit, the first author of the manuscript should share the decision letter from the editor with each coauthor, then schedule a time to discuss the feedback. At this meeting, the coauthors should talk with one another about the concerns noted, the suggested changes, and whether the revisions are feasible. If the team decides to make the changes, they can move forward with the revision process in accordance to the timeline provided. If an extension is needed, it is best to contact the editor as soon as possible and to request a specific date. If the team decides not to make the changes or to submit the manuscript to a different journal, it is best to contact the editor via e-mail. In this e-mail, the corresponding author can thank the board for their consideration and constructive feedback, and state the decision to withdraw the manuscript from further consideration.

Authors who receive a decision of revise and resubmit can increase likelihood of acceptance by addressing all comments from each reviewer in a detailed and professional letter to the reviewers (APA, 2010b). One effective approach is to copy and paste all reviewer comments into a new document and number each critique or point made by the reviewers. The research team can then respond to each comment in numerical order. Authors can display additional diligence by including quotations and page numbers that point reviewers to changes. Saying “thank you” for positive and/or constructive feedback is also a form of good etiquette. It is permissible to disagree with reviewer suggestions and to refrain from making some of the changes. When this is the case, provide a response that politely articulates the decision. Citations that support the decision to refrain from changes are helpful. Editors and associate editors may also appreciate a cover letter on letterhead that summarizes the changes and thanks them for the thoughtful and constructive feedback. Keep in mind that manuscripts may be rejected if authors do not address all the comments from the reviewers adequately, even if they initially received a revise and resubmit. Authors cannot pick and choose what they would like to address.

Responses to reviewers that seem defensive, patronizing, or dismissive may affect the opinion of the reviewers, so approach these revisions in a conscionable manner. Reviewers often spend several hours on each manuscript review. Thus, gratitude and clear integration of feedback is appreciated. When the revision is submitted, the manuscript is typically returned to the initial reviewers for
Another round of reviews. In addition to receiving the revised manuscript, all reviewers will see the author’s response to their feedback, which reinforces the need for a collegial approach. This round often takes an additional two to three months, and presents another opportunity to practice patience!

Acceptance
Authors are most likely to see decisions of Conditional Accept or Accept after a full round of revisions and a second or third peer-review cycle (APA, 2010b). In other words, it is very rare to receive this decision prior to receiving a Revise and Resubmit decision. Nearly all scientific research has room for improvements, particularly when reviewed by a panel of scholars with expertise in a topic. Due to the number of rounds and revisions, the timeframe from submission to publication for one journal article submitted to one journal can take several months to a year. Of course, the time to publication increases for each journal that considers (and subsequently rejects) a manuscript. For this reason, persistence is key.

After acceptance, the manuscript will be sent to copyeditors for production. Authors will typically receive a proof of the article prior to publication; this is not the time to rework an entire section of a manuscript, but rather, to address minor typos or errors and to check all numbers for accuracy. Once the manuscript has been accepted, students may list the publication on their résumé or CV as “in press.” Celebration is also encouraged!

Ethics

Prior Publication
There are a few ethical factors specific to publishing thesis and dissertation research to which students need to attend. Typically, Electronic Theses and Dissertations (ETDs) are published via ProQuest or a digital commons database, and are thus already considered scholarly (nonpeer-reviewed) publications (Barbour, Irfan, Poff, & Wise, 2017; Hawkins et al., 2013; Ramirez et al., 2014). ETDs present important considerations pertaining to publication ethics—specifically duplicate or prior publication—so it is important for students to be aware of potential concerns that may arise.

Although most journals now have clear policies regarding ETDs, nearly 50% of journals in the social sciences and humanities have some restrictions on what they will publish (Ramirez et al., 2014). When this is the case, editors will consider ETD submissions on a case-by-case basis, expect substantially different content from the original ETD, and/or limit access of the ETD to the university community. Some journal editors may ask that the student removes the ETD from the digital commons. Others may request substantial revisions to minimize similarities in language between the two documents. It is the responsibility of the first author to check with the journal to see if they consider ETDs for publication. Of note, the Psi Chi Journal does not permit any manuscript to be published on any other website or journal, including limited or open-access ETDs.

If the journal is open to publishing thesis or dissertation work, the first author should refer to APA’s Ethical Guidelines (APA, 2002), the Journal Article Reporting Standards (Cooper, 2011), and the Committee on Publication Ethics (COPE) best practices (Barbour et al., 2017). First, the author should note in the cover letter that the submitted manuscript reflects previous academic work (APA, 2002; Barbour et al., 2017; Cooper, 2011). An author note should summarize previous circumstances in which findings were disseminated to the public including research conferences, presentations, theses, or dissertations (Cooper, 2011). The citation to the ETD should also be included in the cover letter and the manuscript. Note that this citation should be de-identified in the manuscript to allow for masked review.

Duplicate and Piecemeal Publication
Knowing that manuscripts need to be cut in length to be suitable for publication, some students may be advised to split the thesis or dissertation into multiple projects. If this path is chosen, one should be cognizant of APA’s (2010a) guidelines pertaining to duplicate and piecemeal publication of data. Duplicate publication refers to publishing the same data or findings in multiple places; piecemeal publication refers to the separation of data files to falsely reflect separate research efforts.

According to the APA (2002) Ethical Standards, “Psychologists do not publish, as original data, data that have been previously published. This does not preclude republishing data when they are accompanied by proper acknowledgment” (p. 12). In the case of a thesis or dissertation, it is not ethical to publish the same data or findings in the form of multiple manuscripts, leading to the impression that findings are more prevalent than they actually are. It is also considered unethical to “submit manuscripts that have been published elsewhere in substantially similar form or with substantially
similar content” (APA, 2010a, p. 13). It is, however, permissible to publish data in one empirical journal article if the author discloses that findings have been presented to the public in the form of a thesis, dissertation, and/or conference presentation. It is also permissible to revise the form and content of previously published dissertations for consideration in peer-reviewed journals.

Students may also be advised to split the project into more than one manuscript, which leads to a discussion of piecemeal publication. The APA (2010a) advises authors “to present work parsimoniously and as completely as possible within the space constraints of journal publications” (p. 14). They also note that piecemeal publication “is a matter of editorial judgment” (p. 14). Given the complexity of theses and dissertations, it may not be feasible for students to present all findings in a parsimonious manner without separating them into more than one project.

If this is the case, it is important for student authors to have a discussion with their faculty advisors regarding the decision. Authors will want to make sure each manuscript includes previously unpublished data and tells a meaningful and relevant story (Tribe & Tunariu, 2017). It is then the responsibility of the authors to disclose in the cover letter and the manuscript that the data were collected as part of a larger investigation. Authors should be transparent in the Method section by citing the corresponding studies as appropriate. The same variables from the same dataset should not be used in more than one project because such practices can dilute the literature while falsely inflating the perceived presence of phenomena (APA, 2010a). However, it may be appropriate for authors to separate a project based on groups of variables or types of data. For example, a mixed-methods study may result in one manuscript that summarizes the qualitative data and another manuscript that presents the quantitative findings (Tribe & Tunariu, 2017).

Authorship
It is never too soon for a student to discuss authorship expectations with committee members—particularly the chair of the committee. According to APA’s Ethical Standards (2010a), authorship is warranted when team members make a substantial “scientific or professional” contribution to a manuscript (p. 12). Team members who were involved peripherally (e.g., data entry, editing) may be given acknowledgements in an author note.

The APA Ethical Standards also state that students should be listed as the first author on manuscripts that stem from a dissertation. Masters theses and senior honors projects are dependent on the level of student involvement and the role of the faculty advisor.

Aside from the APA guidelines, some teams may appreciate a structured points system described by Winston (1985) when determining authorship order. Regardless of how it is decided, authorship is best navigated with consistent and transparent communication regarding expectations, contributions, and one’s role on a team (Fine & Kurdek, 1993). It can take several months (or years!) to prepare a manuscript for publication. Students who are graduating and leaving their institution should also work with coauthors to create a plan for continued communication throughout the article review and revision process. Roles and contributions within the research team can change within this time frame, so research teams should enter the authorship conversation with the understanding that they may need to revisit authorship as roles change.

Final Reminders
Although the quality of the research is important when submitting articles for publication, it is essential for authors to demonstrate attention to detail, patience, and collegiality during the review and revision process. Before formally submitting a manuscript for consideration, authors should ask a colleague to read through it as a reviewer would, and to provide the team with critical feedback. Teams should also ask colleagues to comb through the manuscript to attend to APA format, APA style writing, and grammar. Minor grammatical errors and APA style mistakes can detract from content, and reviewers may wonder what other important details may have been missed in the research project itself.

It can take several months to prepare an article for submission, so authors should do one final check to make sure the literature is up-to-date. The reviewers have expertise in the field and will expect authors to include recently published articles in the area of interest. After performing the final literature search, authors should make sure all in-text citations and references match within the manuscript. Through the manuscript preparation process, it is common for authors to remove redundant references (often to save space), while adding newly published research. Finally, remember to redact information as appropriate to allow for a
masked review. A fully redacted document means author names are included on a separate title page, are removed from in-text citations, and the name of the institution is removed when referring to Institutional Review Board approval. Failure to appropriately redact a manuscript threatens the integrity of the masked peer-review process.

**Conclusion**

Prior to making the commitment to submit work for consideration in a peer-reviewed journal, it is important for students to understand timelines, expectations, and potential outcomes. Students should also understand the benefits of publication, particularly those who plan to attend graduate school or pursue careers in research or higher education. While waiting on decisions from the editorial board, students can note that they have a manuscript under review in their job or graduate school applications. Although the publication process may take as long as it takes to complete a capstone project (or longer!), it is well worth it. The benefits of publication are long-lasting, and authors will likely walk away with a new understanding and appreciation of empirical research in psychology.

**References**


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The Effects of Physical Attractiveness and Political Affiliation on Facebook Friend Acceptance

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ABSTRACT. The purpose of the present study was to investigate the effects that physical attractiveness and political affiliation have on the likelihood of “accepting” a Facebook friend request. Participants included 120 undergraduate students randomly assigned to view 1 of 6 conditions of a White male Facebook profile. Physical attractiveness of the Facebook profile picture was manipulated in 2 conditions: physically attractive and unattractive. In addition, political affiliation, as identified in the “describe who you are” box on the profile, was manipulated in 3 conditions: Republican, Democrat, and Independent. Following each condition, participants were asked to answer how likely they would be to accept the Facebook friend request of the profile viewed. It was primarily hypothesized that participants would report a significantly higher likelihood of accepting the Facebook friend request for profiles that appeared to be physically attractive and similar to their own political affiliation compared to other profiles. Statistical analyses revealed that, although physical attractiveness significantly increased the likelihood of accepting a Facebook friend request ($p < .001$), neither similarity of the profile’s political affiliation to participants nor the interaction of the two variables were significantly related to acceptance. However, exploratory analyses ($p = .03$) highlighted that participants who identified as Independent were equally likely to accept the attractive and unattractive profiles. Democrat and Republican participants were more likely to accept attractive rather than unattractive profiles, with slight nuances depending on the profile’s political affiliation. Findings are discussed with an emphasis on characteristics associated with the different political parties.

When it comes to establishing relationships, similarity can be drawn upon to stimulate initial interactions. In fact, people like others more when they share similarities (Collisson & Howell, 2014). Similarity in this context can be ambiguously interpreted, although when it pertained to levels of social skills, communication skills, and cognitive complexity, similarity increased likeability in a college context (Burleson & Samter, 1996). For instance, those demonstrating similar understandings of the world through similar communication patterns will have an increased likelihood of becoming friends. The advancement of social media has not only facilitated interactions among young people, but it has also made information about individuals such as their similarities easily accessible.

Martin, Jacob, and Guéguen (2013) demonstrated the influence that Facebook has on facilitating social relationships, particularly in relation to similarity. Participants included 300 female college student Facebook users who were similar in age, race, and nationality per their Facebook profiles. Each participant viewed a researcher-generated profile of a 21-year-old French male with a common

Faculty mentor: Alicia Klanecky, PhD
French name. Participants were randomly assigned to view different Facebook request messages sent by the pseudo-profile that varied in content according to three levels of similarity between the two users: no similarity, similarity of birthday, and similarity of birthday as well as hobby/singer/writer. Results indicated that 48% of the participants accepted the friend request when multiple similarities were present, 41% accepted the request when one similarity was present, and 20% accepted the friend request when no similarities were present (Martin et al., 2013). As indicated, similarity can be a determining factor when choosing to pursue a relationship with another person.

Similarities can be manifested through many different attributes including political affiliation. Poteat, Mereisch, Liu, and Nam (2011) found that people generally favored friendships that shared a similar political ideology. Furthermore, Macafee (2013) speculated that people engaged in online political activity because of how simple it was to affiliate with a political party just by “liking” the party’s Facebook page. Facebook served as a means for users to express their political beliefs during the 2008 and 2012 presidential elections (Fernandes, Giurcanu, Bowers, & Neely, 2010; Pennington, Winfrey, Warner, & Kearney, 2015). In fact, people turned to Facebook to endorse and advocate for their preferred candidate (Carlisle & Patton, 2013). This suggests that political affiliation on Facebook is an item by which users can identify with others who express similar political views. To attain acceptance via intergroup bias, peers may gravitate toward those who share similar political views. Intergroup bias is the inclination to view one’s membership in an in-group more favorably than others’ memberships to an out-group (Hewstone, Rubin, & Willis, 2002). In the context of Facebook, users who can identify with other users who share a similar political affiliation may establish an intergroup bias toward their specific political party. The user’s self-esteem may elevate due to feeling accepted by Facebook members who support similar political ideologies, which may provide a positive social identity for the user to embody (Hewstone et al., 2002). However, the bias toward a political party that is held by members of the in-group may lead to the rejection of members that affiliate with out-group political parties.

Expression of political affiliation on Facebook may be suppressed to prevent rejection from occurring. Further, someone may refrain from openly accepting a friend request that outwardly expresses a specific political affiliation. This is supported by the findings that people often refrain from liking political parties on Facebook because they fear what peers who have opposing political affiliations will think (Marder, Slade, Houghton, & Archer-Brown, 2016). Moreover, as political opinions appear more hostile in manner, an individual is less likely to express political views. This is evidenced by findings that hostile opinions generated on Facebook due to its opinion-based networking system were found to be negatively associated with political expression (Mihee, 2016). In other words, those who perceived the political opinions of Facebook friends as hostile were less likely to express their political opinions via Facebook, and in turn, were less likely to participate in political activities outside of Facebook than those who perceived political opinions of Facebook friends as friendly. Such research indicates that individuals may be motivated to appear politically neutral on Facebook in efforts to gain broader social acceptance. It is likely that this creates a rift between the desire to establish Facebook connections sharing similar political affiliations and the desire to be socially accepted on Facebook. In efforts to better understand when similar political affiliation may facilitate (versus impede) social acceptance, additional attributes need to be examined. Physical attractiveness may be an attribute that increases the likelihood of social acceptance.

A large body of literature has supported the role of physical attractiveness as a characteristic that often sways whether a Facebook user accepts a friend request. In Greitemeyer and Kunz’s experiment (2013), undergraduate Facebook users attending the University of Innsbruck were randomly assigned to view a friend request from an unfamiliar profile. Researchers manipulated the name valence and physical attractiveness of the profile. Results indicated that users were most likely to accept requests that were both physically attractive and had a positively valenced name. Users were also more likely to accept requests if the profile was moderately attractive with a positively valenced name, or if the profile was attractive with a negatively valenced name. These results emphasize physical attractiveness as an important factor when judging whether to initially interact with someone. Peña and Brody (2014) further depicted physical attraction as a normative influence for keeping someone as a friend on Facebook. If a Facebook profile was engaging in hurtful or threatening communication, the receiver was more likely to keep
the person as a friend if the person was considered physically attractive. Their study suggests that Facebook users choose to maintain relationships with physically attractive profiles to elevate their own self-confidence and physical attractiveness because a person who has physically attractive friends is presumed to be physically attractive (Peña & Brody, 2014).

In summary, research regarding the effect that similarity of political affiliation has on the likelihood of accepting a Facebook friend request is unclear. Similar political affiliation can facilitate Facebook relationships, but people may choose not to politically affiliate in efforts to avoid rejection. Physical attractiveness is a variable that may help strengthen the relationship between political affiliation and likelihood of acceptance. Physical attractiveness is known to sway people’s acceptance of others. However, to the authors’ knowledge, no study has examined the interaction between political affiliation and physical attractiveness when evaluating a Facebook profile. The present study addressed the initial onset of a Facebook relationship, the friend request, to investigate whether these attributes would impact a person’s likelihood to accept. In the current study, researchers hypothesized that Facebook users would report a significantly higher likelihood of accepting a Facebook friend request for profiles that appeared to be physically attractive and similar to their own political affiliation compared to other profiles. Gender was not included in the current analyses because research has indicated that both men and women attend to attractive and unattractive faces of the other sex (Hooff, Crawford, & Vugt, 2011).

**Method**

**Participants**

One hundred and twenty undergraduate students participated in the study. Participants self-selected into the study using the Psychology Department’s online research participation system. Out of all the participants, 68.33% were women and 31.67% were men, with an average age of 18.93 (SD = 2.38). Most identified as White or European American (70%), with 14.2% Asian or Pacific Islander, 9.2% Hispanic or Latino, 4.2% Black or African American, and 2.4% as “Other” or “Rather not answer.” Additionally, 36.67% of participants affiliated as Republican, 30% of participants affiliated as Democrat, and 33.33% affiliated as Independent. In exchange for participation, participants received class credit. The current study was initially completed as a course project. Creighton University institutional review board (IRB) approval was gained following the course to allow for additional data analyses and project dissemination.

**Materials**

Facebook profiles were created to measure the likelihood that a participant would accept the Facebook friend request with varying physical attractiveness and political affiliation. Six different profiles were manipulated to display one of two pictures, physically attractive (see Figure 1) or unattractive, as well as one of three political affiliation labels (Democrat, Republican, or Independent). The six different profiles were displayed randomly and at equal intervals. The attractive and unattractive photo conditions eliminated potential confounds by using White male headshots with the same hair color, eye color, background color, and shirt color. Male headshots were selected to best ensure the likelihood that the profile’s characteristics, namely political affiliation, would be attended to in addition to the photo. This decision was based on Seidman and Miller’s (2013) finding that participants spent significantly more time viewing the Likes and Interests disclosed on male Facebook profiles than...
the actual profile photos, whereas participants spent more time viewing the profile pictures of women rather than their Likes and Interests (Seidman & Miller, 2013). Further, the profile’s political affiliation label was strategically placed directly under the profile photo, to aid participants’ view of political affiliation in the instance that the profile photo was more attended to. The six Facebook profiles all utilized the same photo of Creighton University’s campus as their background cover picture. Further, all profiles were formatted to appear as friend requests through the inclusion of a “respond to friend request” button on the profile page that typically displays during a Facebook request.

Following the profile, participants were asked to indicate the likelihood that they would accept the Facebook profile friend request on a 10-point Likert-type scale ranging from 10 (definitely accept) to 1 (definitely would not accept). In addition, a second 10-point Likert-type scale was presented to indicate the degree of attractiveness the participants found the profile, ranging from 10 (extremely attractive) to 1 (extremely unattractive). The experiment was conducted through Qualtrics, an online survey program, through which Facebook use and demographic information was acquired. Demographic information included gender, age, race, sexual orientation, political affiliation, academic year, and relationship status. Specifically, participants were asked to indicate their gender (i.e., man, woman, other, or “rather not answer”) and their political affiliation (i.e., Republican, Democrat, or Independent).

Procedure
Participants began by opening Qualtrics online in a setting of their choosing. They were first presented with the informed consent. After reading, participants indicated their consent by clicking the “next” arrow. Participants were randomly assigned to view one of the six Facebook profile conditions for 30 seconds. After viewing the profile, participants reported the likelihood that they would accept the profile friend request and how attractive they found the profile. Then, each participant answered the same Facebook use and demographic questions. The Likert scale addressing physical attractiveness served as a manipulation check to ensure the effectiveness of the attractiveness manipulation. A debriefing was presented at the end of the study to inform participants about the experiment and to clear up any misconceptions about the study.

Results
Preliminary Results
To test the manipulation for the independent variable of attractiveness, a one-way Analysis of Variance (ANOVA) was conducted. Results indicated that there was a significant difference in the perceived physical attractiveness between the two conditions, $F(1, 118) = 159.74, p < .001, \eta^2_{partial} = .58$. Results revealed that participants found the picture used in the attractive condition to be more physically attractive than the picture used in the unattractive condition. See Figure 2.

Primary Results
To test the hypothesis that Facebook users would report a significantly higher likelihood of accepting the Facebook friend request for profiles that appeared to be physically attractive and similar to their own political affiliation, a 2 x 3 x 3 factorial ANOVA was conducted among profile attractiveness, profile political affiliation (Democrat, Republican, or Independent), and participant political affiliation (Democrat, Republican, or Independent). Results indicated that there was a significant main effect for attractiveness, $F(1, 100) = 17.97, p < .001, \eta^2_{partial} = .15$. Consistent with the research hypothesis, those who viewed the physically attractive condition reported a significantly higher likelihood of accepting the Facebook friend request than those who viewed the physically unattractive condition. The main effects for profile, $F(2, 100) = 0.81, p = .45, \eta^2_{partial} = .02$, and participant political affiliation, $F(2, 100) = 1.95, p = .15, \eta^2_{partial} = .04$, were not significant. Contrary to the research hypothesis, the two-way interaction between profile political affiliation and participant affiliation was...
follow-up analyses (minimum mean difference = 2.30), results indicated that, consistent with the above two-way, research participants identifying as Independent were equally likely to accept attractive and unattractive profiles, regardless of the profile’s political affiliation. In contrast, participants who identified as Democrat were more likely to accept the attractive rather than the unattractive profile, particularly when the profile was labeled as Democrat or Republican. They were equally likely to accept the Independent profile. Republican participants were more likely to accept the attractive rather than unattractive profile, particularly when the profile was labeled as Republican or Independent. They were equally likely to accept the Democrat profile. See Figure 3.

Discussion

The current study investigated the effects of physical attractiveness and political affiliation on the likelihood of accepting a Facebook friend request. Statistical analyses revealed that participants viewing the physically attractive condition had a significantly higher likelihood of accepting the Facebook friend request compared to those viewing the unattractive condition. Although similar political affiliation was not found to significantly increase the likelihood of accepting a friend request, unexpected findings of participants’ political affiliation on attractiveness indicated that Independents were just as likely to accept attractive and unattractive profiles, regardless of political affiliation. On the contrary, Republican and Democrat participants were significantly more likely to accept profiles that were attractive rather than unattractive, although the profile’s political affiliation had an influence. Specifically, Democrat participants were more likely to accept attractive Facebook profiles that politically affiliated as Democrat or Republican and were less swayed by attractiveness in accepting Independent profiles; whereas Republican participants were more likely to accept attractive profiles that politically affiliated as Republican or Independent, and were less swayed by attractiveness in accepting Democratic profiles.

Previous research studies on attractiveness are consistent with the current study’s findings. For example, Greitemeyer and Kunz’s (2013) study on name valence and physical attractiveness found that more Facebook friend requests were accepted when the profile appeared to be physically attractive. These findings suggest that physical attractiveness is an overt determinant when evaluating a Facebook profile.
friend request perhaps through an association of beauty to positive characteristics. People who appear to be attractive may be perceived as more confident, mentally healthy, and competent than those who appear to be unattractive (Langlois et al., 2000; Mobius & Rosenblat, 2006). Therefore, participants might have attributed these positive characteristics to the physically attractive Facebook profile condition, resulting in significantly higher likelihoods of acceptance compared to the physically unattractive condition.

No prior research has examined the interaction between physical attractiveness and similarity of political affiliation on the likelihood of accepting a friend request on Facebook. Although a large literature has referenced the importance of similarity in liking or acceptance (e.g., Martin et al., 2013), current findings indicated that similarity of political affiliation was less important when rating acceptance. Political affiliation alone may not provide enough information for participants to sufficiently gauge similarity. For example, Chen and Kenrick (2002) found that similarity between research participants and a target profile, as measured by consistent attitudes on a range of issues (e.g., immigration, interracial dating, and environmental protection), was a significant determinant of desired contact with the profile. However, the profile’s political affiliation alone did not predict desired contact. Additionally, the relations between similarity in attitudes and desired contact were not altered by similarity of political affiliation between the participant and the profile. Results may suggest that, in the case where only a political affiliation is listed (as opposed to various attitudes on political issues), individuals may rate acceptance in part by utilizing characteristics that are associated with certain political memberships.

Our exploratory finding that Independents were less swayed by attractiveness across the Facebook profile’s three political affiliations was unexpected, although it may suggest that characteristics associated with an Independent political membership to some degree may override the importance of similar political affiliation, especially when similarity is evidenced only by a label. For example, Hawkins and Nosek (2012) indicated that self-proclaimed Independents chose their political membership for reasons such as wanting to express views that do not align with one party. Further, they want to remain objective and to be free of labels. With an emphasis on objectivity and being free of labels, Independents may be less conforming. They may not easily follow social norms associated with attractiveness or similarity when evidenced by a label. As such, ratings of acceptance may be less biased by attractiveness or similar political affiliation compared to individuals identifying with alternative political affiliations.

Reasons were examined to explain why participants identifying as Republicans and Democrats were significantly more likely to accept attractive profiles, with nuances depending on the profile’s political affiliation. No evidence of an in-group or out-group bias was given, meaning that Democratic participants did not rate profiles with similar or different political affiliations within the same attractiveness condition as either more or less attractive. Accordingly, the current findings may again be interpreted using research identifying characteristics associated with political party membership, such as the characteristic of liberalism. Liberalism is positively associated with openness to novel experiences, self-esteem, and curiosity (Jost, Glaser, Kruglanski, & Sulloway, 2003). Democrats’ elevated self-esteem may increase their likelihood of accepting attractive profiles as a potential reciprocal method of sustaining their own self-esteem (Peña & Brody, 2014). Their openness to novel experiences may make them more inclined to accept attractive profiles that affiliate with the opposing partisan party. In contrast, behavioral analyses have revealed that conservatism is positively associated with acceptance of social norms and fear of threat (Gerber, Huber, Doherty, & Dowling, 2011; Jost et al., 2005). Republican participants may be more inclined to accept attractive profiles politically affiliating as Republican or Independent to the degree that they adhere to attractiveness norms, particularly with individuals from similar or nonthreatening political parties. Independents may be perceived as nonthreatening to Republicans, given that 39% of Independents lean toward Conservative ideals (Pew Research Center, 2015). That said, significant caution should be used when generalizing research examining characteristics of a group to any one individual. Further research is needed to better examine the degree to which college students align with behavioral analyses identifying characteristics associated with political party membership, and the degree to which such characteristics contribute to judgments regarding acceptance.

There were several limitations to the current study. First, because the study collected data from a sample of undergraduate students enrolled in psychology courses, results may be less generalizable.
to alternative samples such as noncollege young adults. Second, there are possible limitations using an online survey delivery. As seen in an online study by Yu (2016), survey data may be subject to social desirability and response biases. Additional limitations may be that the online experiment was subject to potential confounds such as multitasking, time of day, and variability of location. Third, it was discovered that the attractive male headshot used in the present study was making direct eye contact with the viewer; however, the headshot used in the unattractive condition seemed to be looking slightly past the viewer, making indirect eye contact. In prior research, faces that made direct eye contact received higher attractiveness ratings compared to faces that made indirect eye contact (Ewing, Rhodes, & Pellicano, 2010), suggesting that the slight alterations in eye contact may have acted as a confound in the current ratings of attractiveness and potentially acceptance. Future research may work to replicate the present study's findings keeping eye gaze consistent across headshots, or may work to manipulate attractiveness and eye contact to understand how cognitive processing of eye gaze influences findings. Although researchers used young, White men with brown hair for the Facebook profile photos to reduce confounds, potential race and gender biases might have further limited the study. Lastly, although efforts were made to ensure that participants attended to the profile's political affiliation, it cannot be guaranteed.

In summary, findings supported the first part of the hypothesis that Facebook users would report a significantly higher likelihood of accepting a Facebook friend request for profiles that appeared to be physically attractive compared to physically unattractive. Although similarity of political party affiliation did not interact with attractiveness, a three-way interaction indicated that research participants identifying as Independent were just as likely to accept attractive and unattractive profiles, regardless of the profile's political affiliation. In contrast, Republican and Democrat participants were more inclined to accept the attractive compared to the unattractive profile. Again, further research is needed to better examine the extent to which college students align with behavioral analyses identifying characteristics associated with political party membership, and the extent to which characteristics aid in formulating first impressions online and in person. As Facebook continues to be a generational means to establish relationships, express oneself, and advocate for one's interests, research should also examine how variables such as political affiliation and attractiveness display online interactions with the larger social context, for example, national political events such as presidential elections.

References


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In 1958, Piaget laid the foundation for lifespan developmental cognition by proposing four cognitive stages that take place throughout human development, beginning in infancy. The four stages include: sensorimotor, preoperational, concrete operational, and formal operational. He proposed that the stage of formal operational cognition is the final stage in adult cognitive thought. However, in more recent research, findings have shown that formal operational thought is not the end of cognitive development for all adults (Kallio, 2011). As an extension to the four existing stages of cognition, researchers have outlined a fifth stage labeled postformal thought (Cartwright, Galupo, Tyree, & Jennings, 2009; Kallio, 2011; Sinnott & Johnson, 1997).

Postformal thought begins during emerging adulthood, a time after adolescence but before young adults have a stable career and family (Berger, 2014; Galupo, Cartwright, & Savage, 2010; Morton et al., 2000). It is a progression from the previous stage of formal thought, which emerges in adolescence (Kallio, 2011; Sinnott, 2014; Sinnott, Hilton, Wood, Spanos, & Topel, 2015). Because postformal thought is a newly identified stage of cognition, a precise definition has yet to be well-established. However, researchers have described the type of thinking characteristic of postformal

ABSTRACT. A recently identified stage of developmental cognition, postformal thought is a type of complex cognition involving recognition of paradoxes and multiple perspectives, which research suggests benefits intrapersonal and interpersonal functioning. The current study aimed to examine postformal thought in the context of romantic relationships, while specifically examining if postformal thought moderates the inverse relationship between partner blame and marital satisfaction. It was hypothesized that participants with enhanced postformal thought would project less blame onto their spouse, and thus have increased marital satisfaction. In a sample of 109 participants, findings supported past research in that blame toward one’s partner was negatively correlated with marital satisfaction on both the Causal, $r(107) = -0.21, p = 0.03$, and Responsibility, $r(107) = -0.24, p = 0.01$, Relationship Attribution subscales and the Marital Attitude Scale, $r(107) = 0.38, p < 0.001$. However, contrary to the hypothesis, postformal thought was associated with increased partner blame on both the Causal ($r = 0.35, p < 0.001$) and Responsibility ($r = 0.26, p = 0.007$) Relationship Attribution subscales, as well as the Marital Attitude Scale, $r(107) = -0.325, p = 0.001$. The current study adds to the body of literature which has asserted that the more one blames a partner, the more dissatisfied one is with a relationship—a relevant finding for clinical work. Implications of a negative relationship between postformal thought and marital satisfaction are discussed, and this relationship may underscore the limitations of postformal thought as a relatively new and at times poorly conceptualized concept.
thought in numerous ways. According to Sinnott (2014), formal operational logic involves believing that one correct answer always exists—for example, in a mathematical equation or in logical reasoning problems. Postformal thought, however, is more complex because it involves recognizing less concrete truths, views ambiguity and paradox as being a part of the nature of life, and produces multiple solutions to a problem through recognizing the possibility that there may be many causes to a problem (Sinnott, 2014). Postformal thinking integrates objective and subjective thought, as opposed to merely thinking objectively as in formal operational thought (Cartwright et al., 2009; Galupo et al., 2010; Morton et al., 2000).

In addition, postformal thought is said to be synonymous with dialectical thinking, defined as the acceptance of contradiction and the nonabsolute nature of knowledge (Bai, Harms, Han, & Cheng, 2015; Kallio, 2011); for example, rivals can also be business partners (such as when Microsoft kept Apple from going bankrupt by investing in the company). The cognitive processes in this stage allow postformal thinkers to implement more tolerance of others’ points of view, yet maintain ability to synthesize views in order to settle on one solution (Sinnott, 2014). Thus, postformal thought is more practical, flexible, and dialectical than formal operational thought (Berger, 2014).

Unlike the first four stages of cognition, however, the conceptualization of postformal thinking is less robust. In an analysis of Sinnott and Johnson’s (1997) Postformal Thought Scale, Cartwright et al. (2009) identified three factors. The first factor, Underlying Complexities, is the ability to see the complexities of a given problem or situation (Cartwright et al., 2009; Morton et al., 2000; Sinnott & Johnson, 1997); for example, seeing paradoxes such as the recognition that providing a stimulant can actually calm a child (Sinnott & Johnson, 1997). Items 1–3 of Sinnott and Johnson’s (1997) scale measured this factor. The second factor, Subjective Choice, as measured by Sinnott and Johnson’s (1997) Items 4–6, involves the recognition that there may be many ways to define a life experience (e.g., someone who has suffered a horrific attack may define themselves as both a survivor and a victim) or to solve a problem (e.g., using the new Common Core or the more traditional ways of solving math problems), and that one must subjectively choose a particular one of these choices. Thus, one comes to recognize that one’s own thinking is subjective.

The third factor, Multiple Elements, is the capacity to contemplate multiple elements (e.g., several causes, several solutions, and/or goals) of a given situation or problem, as measured by Sinnott’s (1997) Items 7–10. For example, the problem of unrest in the Middle East has multiple causes and is unlikely to be solved by one simple solution. Although Sinnott and Johnson’s (1997) scale is the predominant measure of postformal thought, there is a problem in defining a term by its measures. Of some concern, Cartwright et al. (2009) and Galupo et al. (2010) found the scale to be only moderately reliable ($\alpha = .63$). Yet the scale’s validity as a measure of complex thought stands more firmly, as it moderately correlated to the Need for Cognition scale, as well as to Sinnott’s problem-based reasoning cognitive tasks (Cartwright et al., 2009; Sinnott & Johnson, 1997).

In terms of how one acquires postformal thought, scholars believe that adult cognition can be developed or changed through experiences. Subjective, personal experiences often allow for opportunities where multiple perspectives can be contemplated—such as in interpersonal relationships requiring conflict resolution or negotiation (Cartwright et al., 2009). Experiences such as these produce cognitive changes in adulthood (Cartwright et al., 2009). Research findings suggest that having “cross-category” friendships (differing in race, sexual orientation, age, or social class) contributes significantly to enhancement of postformal thinking (Galupo et al., 2010). Thus, postformal thought is not only displayed in social situations but can be acquired and enhanced through them.

Because postformal thought is a newly identified stage of cognition, there is much to learn about its implications. Although some research has been conducted relating postformal concepts to other cognitive aspects and measures, much less research has evaluated postformal thinking in relation to noncognitive constructs including social behavior, personality, and intrapersonal functioning (Griffin et al., 2009). The limited amount of research includes research on related complex cognitions and romantic relationship functioning, but only Sinnott (2014) directly discussed postformal thinking in romantic relationships. The current study aimed to further examine the complex cognitions of postformal thought in the context of romantic relationships, while specifically looking at the association between postformal thought and marital satisfaction as impacted by the social behavior of blame projection.
Postformal Thought and Marital Satisfaction

Postformal Thought and Intrapersonal Functioning
Research has related postformal thought to several beneficial aspects of intrapersonal functioning. Postformal thinking, as measured by Sinnott and Johnson’s (1997) scale, was correlated with two personality traits of Costa and McCrae’s NEO Five Factor Model: Openness to Experience and Conscientiousness (Griffin et al., 2009). Additionally, research has found a positive correlation between dialectical thinking and an individual’s coping flexibility, defined as the ability to formulate flexible strategies under the demands of unpredictable circumstances (Cheng, 2009). As previously mentioned, dialectical thinking is synonymous with postformal thought and involves the pursuit of knowledge and truth through thoughtful synthesis of opposing viewpoints. Considering this correlation, Cheng explained the proposed link between dialectical thinking and coping flexibility using Basseches’s 1984 model of patterned movement of thoughts. The model involves an individual proposing a thesis, recognizing its contradiction or antithesis, and synthesizing the two positions into one holistic proposition. The synthesis is not the same as a compromise; it incorporates both the thesis and antithesis into a more transformative conclusion (Berger, 2014). Applied to coping flexibility, individuals faced with a stress-inciting event may enact this dialectical thesis-antithesis pattern of thought and accept that every coping strategy has its own strengths and weaknesses depending mostly on the situation at hand. They then can synthesize the strategies into a “meta-strategy” that is flexible and thus of the postformal nature (Cheng, 2009). Thus, personality traits and coping behaviors related to postformal thinking appear to be positive and beneficial to an individual’s personal well-being. The current research explores whether positive effects also extend to interpersonal—specifically marital—well-being.

Postformal Thought and Interpersonal Relationships
In addition to intrapersonal functioning, postformal thought, as measured by Sinnott and Johnson’s (1997) scale, has also been related to positive aspects of interpersonal functioning in relationships and friendships. For example, postformal thought has been positively related to favorable attitudes toward lesbians and gay men (Griffin et al., 2009) and having a greater number of cross-category friendships (differing in race, sexual orientation, age, or social class; Galupo et al., 2010). Close, as opposed to casual, cross-category friendships foster motivation to be cognizant of differing perspectives (Galupo et al., 2010).

Postformal thinking has not only been related to friendships but also to workplace relationships. Morton and colleagues (2000) assessed the postformal quality of physician-patient interaction as predicted by postformal thought. The physicians with the highest level of postformal thought, here measured by tolerance of ambiguity (Budner, 1962) and cognitive empathy (Davis, 1980, 1983), had higher ratings of clinical performance in patient satisfaction, responsiveness to patients, and effective taking of health history. Thus, postformal thinking was related to efficiency in physicians’ jobs due to positive interactions with their patients. Similarly, leaders in the workplace who used dialectical thinking and enacted a cooperative approach to conflict management (as opposed to a competitive one) fostered higher “in-role performance” and employee creativity (Bai et al., 2015). This cooperative approach enacted the postformal properties of tolerance of ambiguity, inconsistencies, and contradictions. Although it has not previously been tested, the associations of workplace and social relationships with postformal thought suggest that similar associations would be present in the context of marital relationships.

Postformal Thought and Romantic Relationships
Because romantic relationships have not been studied in relation to postformal thought specifically, it is noteworthy to look more broadly at how romantic relationships are related to complex cognition in general (with postformal thought being a specific type of complex cognition). In looking at cognitive complexity and marital interactions in newlyweds, Karney and Gauer (2010) found that the more complexly a spouse reported a given problem in marriage, the less that spouse used negative behaviors such as blaming, rejecting, criticizing, avoiding responsibility, and hostility when taking part in problem resolution. Karney and Gauer (2010) defined complex cognition by higher levels of differentiation (perceiving more categories or kinds of information from analyzing a given event or person) and integration (connecting or synthesizing different qualities and characteristics). Similarly, Tyndall and Lichtenberg (1985) suggested that couples who exhibited higher cognitive flexibility by a high tolerance for ambiguity showed more adaptable interpersonal strategies in their
The tendency of distressed couples to see negative events as the responsibility of their ill-intentioned partner and as globally impactful on their relationship (see Bradbury & Fincham, 1990, for a complete review of the literature). The strong relationship between reduced blame and increased relationship satisfaction makes it a complex cognitive process of particular interest to study.

Although Showers and Kevlyn (1999) found that evaluative integration, a type of complex cognition similar to postformal thought, is related to less partner blame, no empirical work to date has been conducted to directly test Commons and Ross’s (2008) claim that the larger concept of postformal thinking is related to reduced blaming in relationships. Thus, the current study examined whether enhanced postformal thinking is related to a reduction in partner blame and thus contributes to increased relationship satisfaction. We hypothesized that those who have enhanced postformal thought would project less blame onto their romantic partner and thus have increased relationship satisfaction. This hypothesis included three components: (a) postformal thought would be positively correlated with marital satisfaction, (b) postformal thought would be negatively correlated with partner blame, or negative partner attribution, and (c) postformal thought would moderate the inverse relationship between partner blame and relationship satisfaction. Examining this interaction between postformal thought and partner blame can provide new information about this newly identified stage of cognition as well as valuable applications to improve the quality of intimate relationships.

Method
Participants
We recruited participants online through Amazon Mechanical Turk. Out of 170 participants recruited, 109 met the inclusion criteria for a response rate of 64%. Participants (66 women, 43 men) were all married and ranged in age from 22 to 66 years ($M = 39.5, SD = 10.8$). On average, participants were married for 12.4 years ($SD = 9.0$) and had been in the current relationship with their spouse for an average of 15 years ($SD = 9.6$). See Table 1 for complete demographic characteristic data for the sample.

The inclusion criteria for this study consisted of being over the age of 18, having completed at least 10 years of education (to ensure comprehension of questionnaires), and being married a minimum of four years. We based the length of marriage criteria on research suggesting that newlyweds tend to
experience a pattern of satisfaction decline within the first four years of marriage, after which a more normalized gradient of satisfaction appears across couples (Karney & Bradbury, 1997; Kurdek, 1998).

**Measures**

**Demographic questionnaire.** A demographic questionnaire assessed the following variables: gender, age, ethnicity, socioeconomic status, highest level of education received, length of years in current relationship, and if married, the number of years. Since same-sex marriage was not nationally recognized until 2015, it would not be legally possible for most same-sex couples to meet the study’s requirement of four years of marriage. Thus, sexual orientation and gender of one’s partner were not assessed on the demographic questionnaire.

**Postformal thought.** Individuals’ levels of postformal thinking were assessed with the Postformal Thought Scale (Sinnott & Johnson, 1997). This scale assesses dimensions of complex thought including metatheory shift, problem definition, process/product shift, parameter setting, pragmatism, multiple solutions, multiple goals, multiple methods, and paradox. The 10-item questionnaire asks participants to respond using a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). All items are summed for a total score ranging between 10 and 70, with higher scores indicating a greater level of postformal thought. Items include statements such as, “I can see the hidden logic in others’ solutions to problems, even if I do not agree with their solutions” and “I tend to look for several causes behind any event.” The measure has moderately reliable internal consistency ($\alpha = .63$; Cartwright et al., 2009; Galupo et al., 2010). Internal consistency for the current sample was acceptable ($\alpha = .81$).

**Marital satisfaction.** Marital satisfaction was measured using the Quality of Marriage Index, a 6-item questionnaire, developed by Norton (1983). Participants respond to the first five items based on how strongly they agree with statements using a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). Items evaluate global satisfaction of one’s marriage and spouse with statements such as, “My relationship with my partner is very stable.” The sixth item uses a 10-point Likert-type scale to measure a global degree of satisfaction in the marriage, ranging from 1 (extremely low) to 10 (extremely high). Ratings across all items are summed with a possible range of 6 to 45, where higher scores demonstrate greater marital satisfaction. Previous studies have established internal consistency for the measure to be high with Cronbach’s $\alpha$ ranging from .94 to .96 (Barry & Kochanska, 2010; Graham, Diebels, & Barnow, 2011). The measure also has high validity because it correlates significantly with the Dyadic Adjustment Scale for both women ($r = .90$) and men ($r = .89$; Heyman, Sayers, & Bellack, 1994). Internal consistency for the current sample was strong ($\alpha = .97$).

**Blame projection measures.** There were two assessments of blame.

**Relationship attribution measure.** To assess partner blame, two measures were used. The first measure was the Relationship Attribution...
Measure, a 24-item scale that assesses the extent to which an individual attributes common negative events of a marriage to their spouse (Fincham & Bradbury, 1992). The scale measures two types of partner attribution: (a) Causal Attribution, which refers to the explanation the spouse makes for the negative event, and (b) Responsibility-Blame Attribution, which refers to the extent one feels that a partner is accountable for negative events. The questionnaire presents four hypothetical negative partner behaviors such as “Your spouse criticizes something you say.” Each hypothetical behavior is followed by six statements, three assessing Causal Attribution (Locus, the extent to which cause rests in the partner; Globality, the extent to which it effects other areas of the marriage; and Stability, the extent to which the cause is likely to change) and three assessing Responsibility-Blame Attribution (Intent, the intentionality of the act; Motivation, the motivation for the act; and overall Blameworthiness, the extent to which the partner deserves blame for the act). Participants are asked to rate the extent to which each dimension would explain the hypothetical behavior on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). Separate composite scores are obtained for Causal Attribution (Locus, Globality, Stability) and Responsibility-Blame Attribution (Intent, Motivation, Blameworthiness), as well as a Total Relationship Attribution Scale (the two subscales combined). The possible scores for the subscales ranged from 12 to 72 while possible composite scores ranged from 24 to 144, with higher scores indicating greater extent of negative attribution. Internal consistency was established for composite scores of Causal Attribution for women (α = .84) and men (α = .86) and Responsibility-Blame Attribution for women (α = .89) and men (α = .84), as well as for Total Relationship Attribution for women (α = .91) and men (α = .91), thus asserting that the measure is reliable (Fincham & Bradbury, 1992). Internal consistency for the entire sample was acceptable (α = .77) for the Causal Attribution subscale, strong (α = .90) for the Responsibility-Blame subscale, and strong (α = .91) for the Total Relationship Attribution Scale.

Marital attitude survey. The second measure used to assess partner blame was the Marital Attitude Scale, which assesses dysfunctional attributions within married couples (Pretzer, Epstein, & Fleming, 1991). The questionnaire assesses overall marital attitudes using six subscales; however, only two subscales were selected for the current study as an additional measure of projected blame. The subscales measuring attribution of causality to spouses’ behavior, as well as attribution of causality to spouses’ personality, were selected from this scale because they measure the extent to which spouses see the source of their marital problems as found within their partner. Each subscale consists of four items. Therefore, participants responded to eight items total. Sample items included “If my partner did things differently, we’d get along better” and “I don’t think my problems with my partner are because of the type of person he/she is.” Participants were asked the extent to which they agreed with the items using a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Possible scores range from 8 to 40. Low scores indicate that the participant endorsed the attribution being measured (greater amount of blame), and high scores indicate that the participant did not report engaging in this attribution (less blame) (Pretzer et al., 1991). Internal consistency reliability for the measure was acceptable both for spouses’ behavior (α = .72) and spouses’ personality (α = .66). For the current study, the two subscales were combined into one Marital Attitudes Scale due to the higher internal consistency observed when the two subscales were combined (α = .97). As further justification for combining the two subscales, previous research has demonstrated that the two subscales are significantly positively correlated for women (r = .65, p < .001) and men (r = .55, p < .001) (Pretzer et al., 1991).

Research Design
The study used four self-report surveys. These examined correlational relationships between postformal thought, marital satisfaction, and partner blame.

Procedure
Participants were recruited through an online crowd-sourcing marketplace for human intelligence tasks, called Amazon Mechanical Turk, and completed all measures online. Each participant first completed an informed consent form. Those who met the criteria for participation completed the demographic questionnaire and then four self-report measures in the following order: (a) Quality of Marriage Index, (b) Relationship Attribution Measure, (c) Marital Attitude Scale, and (d) Postformal Thought Scale. Participants who completed the study received compensation of $0.50 through the Amazon Mechanical Turk payment system. Once the study was finished, all participants received a
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debriefing message fully disclosing the intent of the study. The Pepperdine University Institutional Review Board approved this study.

Results

Blame, Marital Satisfaction, and Postformal Thought

A Spearman’s Rho test was conducted to examine the relationships between marital satisfaction, postformal thought, and partner blame due to nonnormality of the distributions of responses. Results are displayed in Table 2. Scores on the Quality of Marriage Index were not significantly correlated to Postformal Thought, $\rho(107) = -.08, p = .40$. However, the Quality of Marriage Index was significantly negatively correlated with the Total Relationship Attribution scale, $\rho(107) = -.25, p = .01$, as well as both the Causal Attribution, $\rho(107) = -.21, p = .03$, and Responsibility-Blame Attribution subscales, $\rho(107) = -.24, p = .01$. These correlations indicate that marital satisfaction was associated with less partner blame—specifically blame involving causal and responsibility attributions. Likewise, the Quality of Marriage Index was significantly positively correlated with the Marital Attitude Scale, $\rho(107) = .38, p < .001$, also indicating that marital satisfaction was associated with less blame, specifically of their partner’s behavior and personality.

A Pearson Product-Moment Correlation was used to examine the relationship between the Postformal Thought Scale, partner blame scores, and marital attitude scores (see Table 2). The Postformal Thought Scale was significantly positively correlated with both the Causal Attribution subscale ($r = .35, p < .001$) and the Responsibility-Blame subscale ($r = .26, p = .007$), as well as the Total Relationship Attribution score ($r = .32, p = .001$). In addition, the Marital Attitude Scale showed similar patterns because it was significantly negatively correlated to the Postformal Thought Scale, $r(107) = -.33, p = .001$. This finding indicates that the more one reports thinking postformally, the more one tends to blame their spouse with negative attribution styles.

As expected, the two measures of blame, Total Relationship Attribution and the Marital Attitude Scale, were significantly negatively correlated with each other, $r = -.50, p < .001$. These correlations indicate that the measures were capturing similar behaviors and attitudes of attribution for the participants in this data set.

Spearman’s Rho tests and Pearson Product-Moment Correlations were used to control for gender in all correlations between marital satisfaction, postformal thought, and partner blame. No significant relationships to gender were observed.

Prediction of Marital Satisfaction

A Hierarchical Multiple Regression was used to assess whether postformal thought would moderate the relationship between partner blame and marital satisfaction. Because the correlation between postformal thought and marital satisfaction while controlling for gender was not significant, gender was not included in the model. Due to the high intercorrelation between Total Relationship Attribution and the Marital Attitude Scale, as well as concern about multicollinearity, scores on the two blame measures were combined into one variable (Blame score) for the hierarchical multiple regression by subtracting Marital Attitude Scale scores (where lower scores indicated more blame) from Total Relationship Attribution (where higher scores indicated more blame). Blame score was entered in Stage 1, followed by Blame and Postformal Thought Scale scores in Stage 2 in order to predict if postformal thought adds any information above and beyond what blame indicates about marital satisfaction as measured by the Quality of Marriage Index. The regression revealed that at Stage...

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**Table 2**

<table>
<thead>
<tr>
<th>Correlations Between the Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Quality of Marriage Index</td>
</tr>
<tr>
<td>2. Postformal Thought Scale</td>
</tr>
<tr>
<td>3. Total Relationship Attribution</td>
</tr>
<tr>
<td>4. Causal Attribution</td>
</tr>
<tr>
<td>5. Responsibility-Blame Attribution</td>
</tr>
<tr>
<td>6. Marital Attitude Scale</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>-0.18</td>
</tr>
<tr>
<td>-0.25</td>
</tr>
<tr>
<td>-0.21</td>
</tr>
<tr>
<td>-0.24</td>
</tr>
<tr>
<td>-0.38</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>-0.08</td>
</tr>
<tr>
<td>-0.32</td>
</tr>
<tr>
<td>-0.35</td>
</tr>
<tr>
<td>-0.26</td>
</tr>
<tr>
<td>-0.33</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>-0.08</td>
</tr>
<tr>
<td>-0.50</td>
</tr>
<tr>
<td>-0.91</td>
</tr>
<tr>
<td>-0.96</td>
</tr>
<tr>
<td>-0.50</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>-0.25</td>
</tr>
<tr>
<td>-0.50</td>
</tr>
<tr>
<td>-0.45</td>
</tr>
</tbody>
</table>

Note: $p < .05$. $p < .01$.

**Table 3**

<table>
<thead>
<tr>
<th>Prediction of Quality of Marriage Index in Hierarchical Multiple Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Step 1</td>
</tr>
<tr>
<td>Blame</td>
</tr>
<tr>
<td>Step 2</td>
</tr>
<tr>
<td>Blame</td>
</tr>
<tr>
<td>Postformal Thought</td>
</tr>
</tbody>
</table>
1, Blame contributed significantly to the model, \( F(1, 107) = 26.73, p < .001 \), and accounted for 20% of the variance (\( R^2 = .20 \)) in marital satisfaction. Adding postformal thought at Stage 2 explained an additional 3% of the variance (\( R^2 = .23 \)), \( F(2, 106) = 15.83, p < .001 \) (see Table 3), suggesting that Blame was the most important predictor of marital satisfaction.

**Supplemental Analyses**

**Gender differences.** The current study used \( t \) tests to examine gender differences on the Postformal Thought Scale, the Total Relationship Attribution Scale (as well as the Causal Attribution and Responsibility-Blame subscales), and the Marital Attitude Scale. Results are displayed in Table 4. A significant gender difference was observed for the Postformal Thought Scale, \( t(107) = 3.29, p = .01 \), with women scoring significantly higher (\( M_w = 46.00, SD = 8.64, M_m = 39.81, SD = 7.78 \)), \( t(107) = 3.44, p = .01, d = .68 \), with women reporting significantly greater mean levels of blame (\( M_w = 74.53, SD = 19.51 \)) than men (\( M_m = 53.48, SD = 6.58 \)). Additionally, a significant gender difference was observed for the Total Relationship Attribution Scale, \( t(107) = 19.51 \), \( p < .01 \), \( d = .67 \), with women scoring significantly higher (\( M_w = 48.58, SD = 11.56 \)) than men (\( M_m = 34.72, SD = 11.56 \)), \( t(107) = 2.80, p = .006, d = .27 \).

A Mann-Whitney U test was used to examine gender differences for the Quality of Marriage Index due to its high level of negative skew at -1.88. The test revealed no significant gender differences (\( p = .62 \)), although men did have slightly higher levels of satisfaction (\( M_{dn} = 56.85 \)) than women (\( M_{dm} = 53.80 \)).

**Education and postformal thought.** A one-way Analysis of Variance was used to examine whether there were differences in levels of postformal thought across different levels of education of participants. The sample sizes across groups with different levels of education varied greatly, so groups with a frequency of less than four participants were excluded from this analysis to avoid error in the homogeneity of variance assumption. Significant education level differences were observed for participants’ levels of postformal thought, \( F(4, 99) = 2.66, p = .04 \), with a moderate effect size (\( \eta^2 = .08 \)). Post-hoc analyses using the Tukey HSD test demonstrated a significant difference in postformal thought scores between those whose highest level of education was high school (\( M = 46.22, SD = 7.24 \)) compared to those who had a bachelor’s degree (\( M = 55.55, SD = 8.21 \)), \( p = .05 \).

**Discussion**

The purpose of the current study was to examine if postformal thought moderated the inverse relationship between partner blame and marital satisfaction. The first hypothesis asserted that postformal thought would be positively correlated with marital satisfaction.

**Postformal Thought and Marital Satisfaction**

This first hypothesis was not supported, indicating that there was no relationship between this type of complex cognition and one’s self-reported marital satisfaction. Past research that has examined the relationship between these two variables has been inconsistent with some studies displaying a positive correlation and some displaying no correlation (Sinnott, 2014). A possible explanation for the lack of correlation between postformal thought and marital satisfaction in the current study could be that cognitive processes are not as salient to complex and highly emotionally involved relationships such as marriages. Instead, aspects such as emotions and behaviors may play a larger role than cognition does in influencing one’s sentiments toward their romantic relationship. Perhaps cognitive processes do not override emotional components of marriages that are related to satisfaction. Thus, it is more likely that postformal thought could affect platonic friendships and workplace relationships.

### TABLE 4

<table>
<thead>
<tr>
<th>Mean Scores Across Gender for the Measures</th>
<th>Men</th>
<th>Women</th>
<th>( t )</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postformal Thought Scale</td>
<td>48.58</td>
<td>53.48</td>
<td>-3.48**</td>
<td>107</td>
</tr>
<tr>
<td>Total Relationship Attribution Measure</td>
<td>74.53</td>
<td>87.41</td>
<td>-3.44**</td>
<td>107</td>
</tr>
<tr>
<td>Causal Attribution</td>
<td>39.81</td>
<td>46.00</td>
<td>-3.80**</td>
<td>107</td>
</tr>
<tr>
<td>Responsibility-Blame</td>
<td>34.72</td>
<td>41.41</td>
<td>-2.80**</td>
<td>107</td>
</tr>
<tr>
<td>Marital Attitude Scale</td>
<td>26.40</td>
<td>23.32</td>
<td>3.29**</td>
<td>107</td>
</tr>
</tbody>
</table>

*Note: \( p < .05 \), \( **p < .01 \), \( ***p < .001 \).*
The lack of correlation between postformal thought and marital satisfaction may also be influenced by the manner in which postformal thought was measured in the current study. As noted earlier, the Postformal Thought Scale has only moderate internal consistency, and the very definition of postformal thought is still vague due to its relatively new addition as a stage of cognition. Participants in the current study completed a self-report questionnaire assessing their levels of postformal thought. However, because this type of cognition is especially complex and contextual in nature, a measure that incorporates active cognitive process in response to various scenarios, with completion of tasks and problem-solving activities, would more accurately capture the construct of postformal thinking. It is quite possible that a better measure of postformal thought would result in significant correlations. The issue of further developing a measure of postformal thought is an important one that needs to be addressed in future research in this field.

Importantly, the current study’s findings support past research that has shown that the more one blames a partner with negative attribution styles for events that take place within the relationship, the more one tends to report dissatisfaction with a relationship (Fincham & Bradbury, 1992; Pretzer et al., 1991). Specifically, findings from the current study suggest that certain types of blame are more highly related to dissatisfied partners than other types. These types of blame tend to (a) have a locus of control specifically resting in their partner, (b) affect multiple areas of the relationship, (c) are stable across time, and (d) involve seeing intent and motivation of a spouse for negative behaviors in a relationship. Additionally, the findings from the current study suggested that dissatisfied spouses tend to specifically blame their partners’ personalities and their partners’ behaviors for negative events that take place in the relationship. Thus, the current study added to the body of research that supports the association between partner blame and marital satisfaction, which is an especially relevant finding for clinical work. The finding that these results support established research in regard to blame and satisfaction suggests that the lack of correlations between postformal thought and marital dissatisfaction is not due to having an unusual participant sample or improper methods. Understanding the relationship between blame and marital dissatisfaction, as well as the types of blame involved in the relationship between these two variables, could aid clinicians in tracking patterns of blame and implementing strategies to reduce it, therefore reducing dysfunction in relationships.

**Postformal Thought and Partner Blame**

The second hypothesis stated that postformal thought would be inversely correlated with partner blame, or negative partner attribution. This hypothesis was not supported, and instead, increased report of postformal thinking was positively correlated with increased partner blaming. The current study was the first to examine postformal thought in relation to partner blame. Although the findings did not support the proposed hypotheses, they did expose a surprising pattern that suggests that the more people tend to report thinking postformally, the more they tend to blame their partner for events and conflicts that take place within the relationship. Considering past research, it seems illogical that postformal thought would be positively correlated with partner blaming. One plausible explanation for this finding is the limited nature with which partner blame was assessed in the current study. The measures of blame used in this study, for example, captured only one person’s perspective and tended toward polarized thinking with items such as, “Whatever problems we have are caused by the things my partner says and does” (Pretzer et al., 1991). Due to postformal thinkers’ tendency toward sophisticated understanding of their relationships, the measures’ lack of dimensionality and limited incorporation of complex two-way interactions might have not fully captured the thought process that a postformal thinker would enact when making attributions. Past research has stated that the complexity of a spouse’s perceptions affects the salience, interpretation, and accessibility of any specific perception (Kareny & Gauer, 2010). Thus, a more dynamic measure such as a live, in-person assessment of dialog from relationship partners about an issue of conflict in their relationship might allow complex thinkers to display how they synthesize perceptions of blame. Further, as previously discussed, use of a more dynamic postformal thought measure would likely allow for a more sophisticated analysis of these behaviors and thought processes. The postformal measure, being self-report, only captures what participants say about their thought processes. However, due to the fact that high scorers on this postformal measure also scored higher on blame measures, this may indicate that they have less sophisticated understanding of their relationships. Thus, taken together, the conceptual vagueness of the postformal reasoning
concept may in fact capture those who are not able to reason about complexities—the same people who are more likely to blame their partners for problems in their relationships.

Aside from effects of the measures used in the current study, a possible alternative explanation for the positive correlation between postformal thought and blame could involve postformal thinkers’ attentive thought processes. Because postformal thinkers are aware of multiple perspectives between themselves and others, perhaps they are more aware of the blaming that takes place within their relationship, and thus report higher levels of blame on the questionnaire. It is likely that postformal thinkers’ awareness of how their subjective personal experience differs in comparison with others would allow them to also be more aware that they blame their spouse.

The third hypothesis stated that postformal thought would moderate the relationship between partner blame and marital satisfaction. Results from the hierarchical multiple regression used to examine this relationship revealed that this hypothesis was not supported. However, the model was significant, indicating that, although postformal thought and partner blame are related, postformal thought does not add anything to the relationship between blame and marital satisfaction. This finding is most likely a reflection of the lack of relationship between postformal thought and marital satisfaction.

Gender Differences and Education Levels
The current study revealed noteworthy gender differences. Women tended to blame their partners to a greater extent than men, which is consistent with past research that suggests this effect may be due to women’s tendency to pay close attention to subtle details of interpersonal interactions, whereas men tend to be more responsive to the overall sentiment of the interaction (Durtschi, Fincham, Cui, Lorenz, & Conger, 2011). Looking more specifically at this gender difference, the facets of the blame measures that women especially tended to score higher on concerned matters of blaming their spouse’s personality, as well as reporting that their blame has global effects in the relationship, endorsing items on the Relationship Attribution Measure such as, “The reason my spouse is spending less time with me is something that affects other areas of our marriage.” Perhaps there is a tendency for women to sense that there are widespread effects of blame on their relationship, which contributes to their overall higher mean scores. With regard to postformal thought and its relationship to various demographic characteristics, women were more likely to think more postformally than men. Past studies on postformal thought have not reported such gender differences (Galupo et al., 2010). This finding is a novel implication to add to the still-developing body of research on postformal thought. The study’s finding concerning the pattern of postformal thought increasing with higher levels of education was consistent with past research, which explains that cognitive growth is related to higher education (Berger, 2014).

Limitations and Directions for Future Research
In addition to the previously mentioned limitations in measuring postformal thought and partner blame, the current study examined blame behaviors strictly among married individuals and did not account for other interpersonal relationships. Because marriages, in particular, are highly complex relationships, there may be many factors that confound with blame and satisfaction. Aspects such as child raising, financial dependence, and sharing of households are just several examples of situations that can complicate marital attitudes.

Most intriguingly, future research could further examine why postformal thought was correlated to partner blame. Perhaps a replication of a similar study on postformal thought and blame could validate or refute the current study’s findings. Research would benefit from different measures of postformal thought and blame such as in-person observation or interviews. A noted limitation of the current study is the use of self-report questionnaires, and further, these questionnaires were not administered in a random order. Future research could improve possible order effects. Additionally, in an effort to examine mechanisms associated with partner blaming, future research could explore a less cognitive psychological process and a more emotional process such as emotional intelligence.

Finally, future research could examine whether the concept of conflict resolution within romantic relationships is associated with postformal thought. Because previous research has highlighted how postformal thinking has been related to coping flexibility and effective conflict management, perhaps postformal thought would manifest less as a thought process such as blame and more as a behavior such as conflict resolution (Bai et al., 2015; Cheng, 2009).
References


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Research has suggested that many students experience significant levels of stress during their college years. Indeed, a recent nationally representative survey conducted by the American College Health Association (2017) found that 45.1% of college students reported experiencing higher than average levels of stress, and 12% reported tremendous amounts of stress. Similarly, 87% of students felt overwhelmed with responsibilities within the last year, and 84% felt mentally exhausted (American College Health Association, 2017). The most common stressors rated by students as “traumatic or very difficult to handle” were academics (47.5%), finances (31.8%), intimate relationships (30.9%), and sleep problems (30%). A higher proportion of women than men reported being affected by each of the 11 individual stressors asked about on the survey. Concerningly,
50% of students (54.2% of women and 39.9% of men) reported experiencing three or more severe stressors in the past year, whereas only 24.7% reported not experiencing any severe stressors (American College Health Association, 2017).

Most researchers and practitioners conceptualize stress as one of the many risk factors that can increase the likelihood that an individual experiences clinically significant mental health problems. Within the college student population, research has suggested that different stressors may be related to different types of mental health symptoms, and that such relationships may also vary by gender. For example, studies have shown that living alone and having a lack of close relationships is related to depression (Ran et al., 2016), whereas being involved in a committed, dating relationship is associated with lower risk of depressive symptoms in women, but not in men, as well as decreased use of alcohol in both women and men (Whitton, Weitbrecht, Kuryluk, & Bruner, 2013). In contrast, intimate relationship stress may predict alcohol use, as well as depressive symptoms in women, but not in men (Whitton et al., 2013). Individuals who have negative experiences or perceptions of the campus climate (e.g., being singled out because of one’s race/ethnicity, gender, or sexual orientation) are more likely to experience psychological distress (Byrd & McKinney, 2012), and body image problems have been linked with symptoms of anxiety and depression (Tao et al., 2002). Stressors such as job insecurity, high pressure or excessive workloads, and performance-avoidance goals have also been shown to be related to depression and anxiety in both women and men (Fan, Blumenthal, Watkins, & Sherwood, 2015; Lavasani, Khezriazar, Amani, & Malahmadi, 2011; Melchior et al., 2007). Finally, financial stress was shown to be associated with psychological distress in one study (Ran et al., 2016; Sáias et al., 2014) but not in another (Verger et al., 2009).

Such studies clearly suggest that a wide range of stressors may negatively impact the mental health of college students. This is not a trivial problem; the most recent National College Health Assessment survey data (2017) revealed that 29.2% of college students were diagnosed with or treated for a mental health problem in the past year. The most commonly reported problems were anxiety (24.3% of women and 11.4% of men) and depression (18.8% of women and 10.5% of men). Other studies have revealed that college students are also at risk for eating disorders and substance abuse problems, with the former typically found to be more prevalent in women and the latter more prevalent in men (Downs, Boucher, Campbell, & Dasse, 2013; Eisenberg, Nicklett, Roeder, & Kirz, 2011; Kokotailo et al., 2004).

Unfortunately, despite the relatively high prevalence of elevated stress and mental health difficulties in college students, research has consistently revealed that most students who have a problem do not seek help. Specifically, studies have found that only 8% to 38% of students who are experiencing a clinically significant mental health problem seek treatment (Caldeira et al., 2009; Cranford, Eisenberg, & Serras, 2009; Downs et al., 2013; Garlow et al., 2008; Hunt & Eisenberg, 2010). This is true even though researchers have noted reduced stigma and an increased willingness to seek help for mental health problems among college students in recent years (Hunt & Eisenberg, 2010; Mojtabai, 2007). Such low rates of help-seeking are particularly vexing considering that the vast majority of colleges offer low or no cost assessment and treatment services on or near campus. Men appear particularly reluctant to seek help, and this is believed to be, at least partially, influenced by the tendency for women to exhibit more willingness to express psychological distress and for men to hold more negative attitudes toward help-seeking (Gonzalez, Alegria, & Prihoda, 2005; Levinson & Ifrah, 2010; Mackenzie, Gekoski, & Knox, 2006).

Considering that most college students report experiencing stressors that are difficult to handle, a significant proportion have a diagnosable mental health problem, and the vast majority with a problem do not seek treatment, there is a clear need for colleges to do a better job of identifying students who could benefit from help. Any such efforts to more effectively identify and provide resources to students who need help would likely be aided by developing a more comprehensive understanding of how different types of stressors impact mental health in college students. This knowledge could be used to help college professionals more intentionally target students who are at risk and then provide such students access to appropriate resources. For example, a student who is experiencing anxiety related to academic demands might benefit from different interventions than a student who is experiencing anxiety related to financial or interpersonal stressors. Unfortunately, given the methodological variability found across studies conducted thus far, most of which assessed a relatively small number of stressors and mental health variables on single
campuses, it is currently somewhat difficult to draw conclusions about how different types of stressors (e.g., interpersonal, financial, work demands) impact the different types of mental health problems college students experience.

The present study had several purposes. First, we conducted a comprehensive assessment of all the stressors identified in the research literature as potentially affecting college students within a single sample in order to develop a better understanding of the different types of stressors college students experience and the relative severity of those stressors. We expected that a factor analysis would reveal that many of the individual stressors examined in previous studies would coalesce into distinct factors (i.e., categories) of stressors. After identifying the primary categories of stressors that college students experience, we then examined differences between women and men in stress levels across categories and in mental health symptoms. Consistent with previous research, we hypothesized that women would report significantly higher levels of stress across categories, as well as higher levels of symptoms of anxiety, depression, and eating problems, whereas men would report higher levels of substance abuse (American College Health Association, 2017; Downs et al., 2013; Downs, Boucher, Campbell, & Polyakov, 2017).

In conducting this study, we also sought to determine how different categories of stressors were related to different types of mental health problems in order to generate information that might prove useful to researchers and professionals who work with college students. We hypothesized that interpersonal stressors (e.g., family problems, problems with roommates) would be associated with depressive symptoms in women and substance use problems in both women and men. We hypothesized that intrapersonal stressors (e.g., personal appearance, self-esteem) would be associated with anxiety and eating disorder symptoms in women but not men, and that performance stressors (e.g., academic demands, pressure to succeed) would be associated with anxiety in both women and men.

We also examined help-seeking behavior to determine whether students who have sought help from a mental health professional reported experiencing different types of stressors or mental health symptoms compared to students who have not sought help. In general, we expected that women would be more likely to seek help than men. Regarding stress, we expected that students who sought help from a mental health professional would report experiencing significantly more interpersonal, intrapersonal, and performance stress than would nonhelp-seekers but would not report experiencing more financial stress. Finally, we expected that students who sought help would report significantly more symptoms of anxiety and depression than would nonhelp-seekers but would not report more symptoms of eating disorders or substance abuse.

**Method**

**Participants**

Data collection occurred between February 2017 and January 2018 using a Qualtrics survey distributed to a nationwide sample of college students via Amazon TurkPrime (n = 216) and through the online research participation system at a university in the northwest United States (n = 348). There were no significant differences in stress scores between the local and national sample. Participants in the national sample scored significantly higher than the local sample on three of the mental health scales (anxiety, depression, and substance abuse). However, the mean differences in those scores between the two groups were relatively small in absolute terms (1.0, 1.2, and 1.5 points on a 15-point scale) and none were clinically significantly different from each other (i.e., all fell well within the same range of severity).

The local and national samples were also similar on most demographic variables. However, the national sample was significantly older than the local sample, with 66.5% of the national sample being 21- to 24-years-old compared to only 10.3% of the local sample. Similarly, 83.2% of the local sample was comprised of first-year students or sophomores, compared to 30% of the national sample. The national sample had a higher proportion of White or European American participants (66% vs. 54.7%) and Black or African American participants (13% vs. 1.8%), as well as a lower proportion of Asian American participants (6.5% vs. 22.6%) than did the local sample. The national sample also had a higher proportion of first-generation college students (28.6%) than did the local sample (14.7%). Finally, participants in the national sample were more likely to report working more than 20 hours per week (36%) than were participants in the local sample (5.6%).

The combined sample of 564 current college students included 44.3% first-year students, 19.7% sophomores, 18.3% juniors, 13.8% seniors, 0.9% postbaccalaureate students, and 1.1% graduate students.
students. The sample averaged 19.6 years of age ($SD = 1.2$), and 67.2% were women. Reported ethnicities included White or European American (57.4%), Hispanic or Latino (11.3%), Black or African American (5.7%), Native American or Alaska Native (0.2%), Asian American (16.8%), and Hawaiian/Pacific Islander (3.5%). Ninety-two percent reported being native English speakers, and 89.7% reported the United States as their country of origin. Twenty-four percent of the sample reported being in a committed unmarried relationship, 1.4% were in a married or domestic relationship, and 58.7% were single. Eighty-three percent reported being heterosexual, 3.3% were gay or lesbian, and 8.5% were bisexual. Nineteen percent of the sample was comprised of first-generation college students, and 48% were employed with 35.4% working 20 hours per week or less and 12.6% working more than 20 hours per week.

**Procedure**

Participants completed an anonymous online questionnaire comprised of the Symptoms and Assets Screening Scale (SASS), the Multidimensional Stress Scale (MSS), and demographic questions. The University of Portland institutional review board approved all procedures and materials used in this study, and each participant provided informed consent prior to completing the study. Participants either received research credit to fulfill psychology course requirements or a small monetary compensation upon completion of the study.

**Measures**

**Symptoms and Assets Screening Scale (SASS).** The SASS is a 34-item self-report measure that was designed to assess overall psychological distress, depressive symptoms, anxiety symptoms, substance problems, eating problems, well-being/assets, and past and current help-seeking behavior in college students. Respondents were instructed to read each SASS item (e.g., “I feel hopeless”) and then indicate how well the item described their experience over the last month on a 4-point Likert-type scale ($not true = 0$; $a little true = 1$; $mostly true = 2$; and $certainly true = 3$). Possible scores for each 5-item SASS subscale (Depressive Symptoms, Anxiety Symptoms, Substance Problems, Eating Problems, and Well-Being/Assets) range from 0 to 15, and the Total Problems scale, which provides a measure of overall psychological distress score, ranges from 0 to 69.

Following the SASS items described above, participants indicated whether they (a) had ever been diagnosed with a psychological problem or disorder, (b) had ever received professional help for a psychological problem or disorder, and (c) were currently receiving professional help for a psychological problem or disorder. If they reported receiving help, participants were asked to specify the type of professional from whom they received help (i.e., psychologist, social worker, counselor, psychiatrist, general medical doctor), whether they received medication or counseling/talk therapy, and how helpful the assistance was ($not at all helpful = 0$; $somewhat helpful = 1$; $very helpful = 2$). The SASS has demonstrated very good reliability and validity within the college student population (Downs et al., 2013). Interested readers may contact the corresponding author to obtain a copy of the SASS and more detailed scoring instructions.

**Multidimensional Stress Scale (MSS).** The MSS is a 32-item self-report measure that was designed for the present study in order to provide a comprehensive assessment of the stressors experienced by college students. The MSS items were developed following an extensive review of established stress measures and the research literature on college student stress and mental health. Participants were instructed to read each item (e.g., “Problems with roommates or housemates”) and then indicate how much each potential stressor had “negatively affected your mental health in the past 12 months” on a 4-point Likert-type scale ($not at all = 0$; $a little = 1$; $a lot = 2$; and $extremely much = 3$). Interested readers may contact the corresponding author to obtain a copy of the MSS.

**Results**

**Identification of Stressor Categories**

An exploratory factor analysis with maximum likelihood estimation and oblimin rotation was performed on the 32 items on the MSS using SPSS. To determine the number of factors to retain, the following criteria were used: (a) eigenvalues greater than 1, (b) visual examination of the scree plots, (c) proportion of variance accounted for by the factor, (d) interpretability of the rotated solution, (e) simple structure of factor loadings, and (f) a minimum of three items loading on each factor. Following the initial extraction, we examined three- through five-factor models and determined that a four-factor model was optimal.

Twenty-three of the 32 MSS items were identified as comprising the following four factors: (a) Intrapersonal Stressors (4 items); (b) Interpersonal Stressors (8 items); (c) Performance Stressors
(8 items); and (d) Financial Stressors (3 items). Intrapersonal stressors and their factor loadings included personal appearance (.80), self-esteem (.65), body image (.84), and lack of confidence (.58). Interpersonal stressors and their factor loadings included intimate relationships (.34), family (.41), friendships (.46), coworkers (.54), roommates/housemates (.43), health problem of a family member/partner/friend (.35), death of a family member/partner/friend (.34), and experiencing discrimination (.46). Performance stressors and their factor loadings included not enough time to get everything done (.62), worries about the future (.65), feeling pressure to succeed (.58), issues with time management (.67), work/school/life balance (.69), academic problems (.59), test anxiety (.45), and feeling pressure to be in college (.41). Financial stressors included financial worries (.70), debt (.84), and job-related stress (.39). The items that comprised each of the four stressor categories demonstrated very good internal consistency reliability with Cronbach’s α ranging from .71 to .90. The 32 items that make up the MSS Total Stress score also showed excellent internal consistency with a Cronbach’s α = .92.

Gender Differences in Mental Health Symptoms and Stress

Table 1 displays the mean mental health scores from the SASS for men and women, and the percentage who fell within the at-risk range. To help control experiment-wise error, a p value of < .01 was used to determine significance for all analyses. Consistent with our hypothesis, our results revealed that women reported more mental health symptoms related to eating disorders, t(534) = 8.39, p < .001, d = 0.85, and depression, t(536) = 3.52, p < .001, d = 0.33, than did men. Similarly, women reported more overall distress, t(497) = 4.93, p < .001, d = 0.48, and men reported higher well-being, t(534) = 2.95, p = .003, d = 0.27. Contrary to hypothesis, men did not report significantly higher symptoms of substance use problems than did women, t(535) = 2.32, p = .02, d = 0.20.

Table 2 shows the mean stress scores across the four categories of stress identified by our factor analysis of the MSS, mean total stress scores, and the percentage of women and men who reported stressors that were impacting their mental health at different levels on the MSS rating scale. Consistent with hypothesis, women reported higher levels of stress than men in most categories including performance stress, t(527) = 4.76, p < .001, d = 0.46, intrapersonal stress, t(527) = 8.39, p < .001, d = 0.85,
interpersonal stress, $t(533) = 4.50, p < .001, d = 0.42$, and overall stress, $t(494) = 6.44, p < .001, d = 0.65$. Contrary to our hypothesis, women did not report significantly higher levels of financial stress than did men, $t(539) = 2.54, p = .01, d = 0.25$.

**Relationships Between Stressors and Mental Health Symptoms**

Table 3 presents the Pearson correlations between mental health symptoms, stressors, and help-seeking behavior for the total sample, and for women and men. Among women, all mental health symptoms were significantly positively correlated with all other symptoms and all stressors. Similar results were found among the men with a few exceptions. Eating problems were not significantly correlated with performance stress or financial stress, and substance use problems were not significantly correlated with well-being in men. For both women and men, eating problems, substance use problems, performance stress, and financial stress were not significantly correlated with a history of help-seeking, whereas anxiety, depression, total distress, intrapersonal stress, and interpersonal stress were. Current help-seeking was not significantly correlated with any symptoms or stressors in women or men.

To determine the extent to which different types of stressors predict mental health symptoms, we ran a series of multiple regression analyses. The four stress categories (intrapersonal, interpersonal, performance, and financial) were entered as

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Eating problems</td>
<td></td>
<td>.26</td>
<td>.37</td>
<td>.46</td>
<td>.66</td>
<td>-.29</td>
<td>.32</td>
<td>.66</td>
<td>.38</td>
<td>.20</td>
<td>.52</td>
<td>.17</td>
<td>-.15</td>
<td>.09</td>
</tr>
<tr>
<td>2. Substance problems</td>
<td>.27</td>
<td></td>
<td>.25</td>
<td>.33</td>
<td>.53</td>
<td>-.14</td>
<td>.18</td>
<td>.16</td>
<td>.31</td>
<td>.21</td>
<td>.26</td>
<td>.05</td>
<td>-.08</td>
<td>.02</td>
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<td>3. Anxiety</td>
<td>.32</td>
<td>.26</td>
<td></td>
<td>.73</td>
<td>.84</td>
<td>-.55</td>
<td>.54</td>
<td>.56</td>
<td>.52</td>
<td>.35</td>
<td>.63</td>
<td>.37</td>
<td>.35</td>
<td>.15</td>
</tr>
<tr>
<td>4. Depression</td>
<td>.47</td>
<td>.32</td>
<td>.71</td>
<td></td>
<td>.89</td>
<td>-.71</td>
<td>.56</td>
<td>.62</td>
<td>.56</td>
<td>.36</td>
<td>.67</td>
<td>.37</td>
<td>.32</td>
<td>.16</td>
</tr>
<tr>
<td>5. Total distress</td>
<td>.64</td>
<td>.51</td>
<td>.83</td>
<td>.89</td>
<td></td>
<td>-.62</td>
<td>.59</td>
<td>.68</td>
<td>.62</td>
<td>.40</td>
<td>.73</td>
<td>.35</td>
<td>.32</td>
<td>.13</td>
</tr>
<tr>
<td>6. Well-being</td>
<td>.63</td>
<td>.69</td>
<td>.85</td>
<td>.87</td>
<td></td>
<td>-.62</td>
<td>.59</td>
<td>.68</td>
<td>.62</td>
<td>.40</td>
<td>.73</td>
<td>.35</td>
<td>.32</td>
<td>.13</td>
</tr>
<tr>
<td>7. Performance stress</td>
<td>.33</td>
<td>.21</td>
<td>.54</td>
<td>.56</td>
<td>.59</td>
<td>-.39</td>
<td></td>
<td>.60</td>
<td>.51</td>
<td>.44</td>
<td>.82</td>
<td>.17</td>
<td>.12</td>
<td>.11</td>
</tr>
<tr>
<td>8. Intrapersonal stress</td>
<td>.18</td>
<td>.22</td>
<td>.46</td>
<td>.51</td>
<td>.50</td>
<td>-.43</td>
<td></td>
<td>.18</td>
<td>.22</td>
<td>.46</td>
<td>.51</td>
<td>.50</td>
<td>-.43</td>
<td></td>
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<tr>
<td>9. Interpersonal stress</td>
<td>.71</td>
<td>.23</td>
<td>.50</td>
<td>.62</td>
<td>.68</td>
<td>-.50</td>
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<td></td>
<td>.56</td>
<td>.32</td>
<td>.83</td>
<td>.33</td>
<td>.29</td>
<td>.01</td>
</tr>
<tr>
<td>10. Financial stress</td>
<td>.38</td>
<td>.21</td>
<td>.62</td>
<td>.61</td>
<td>.59</td>
<td>-.48</td>
<td>.60</td>
<td></td>
<td>.38</td>
<td>.21</td>
<td>.62</td>
<td>.61</td>
<td>.59</td>
<td>-.48</td>
</tr>
<tr>
<td>11. Total stress</td>
<td>.40</td>
<td>.35</td>
<td>.51</td>
<td>.56</td>
<td>.64</td>
<td>-.43</td>
<td>.52</td>
<td>.56</td>
<td></td>
<td>.40</td>
<td>.75</td>
<td>.27</td>
<td>.23</td>
<td>.09</td>
</tr>
<tr>
<td>12. Ever diagnosed?</td>
<td>.28</td>
<td>.38</td>
<td>.52</td>
<td>.52</td>
<td>.55</td>
<td>-.25</td>
<td>.43</td>
<td>.51</td>
<td></td>
<td>.28</td>
<td>.38</td>
<td>.52</td>
<td>.52</td>
<td>.55</td>
</tr>
<tr>
<td>13. Ever seek help?</td>
<td>.17</td>
<td>.22</td>
<td>.30</td>
<td>.34</td>
<td>.37</td>
<td>-.30</td>
<td>.41</td>
<td>.28</td>
<td>.36</td>
<td></td>
<td>.17</td>
<td>.22</td>
<td>.30</td>
<td>.34</td>
</tr>
</tbody>
</table>

**Note.** The values reported above the diagonal correspond to the correlation coefficients for the total sample. Correlations below the diagonal are broken down by gender with women on top and men on the bottom. $p < .01$ (two-tailed).
predictor variables in each analysis with one of the mental health symptoms (eating problems, substance problems, anxiety, depression, well-being, or overall distress) entered as a single dependent variable. Because women and men’s stress and mental health scores were significantly different across most variables, and our hypotheses also varied by gender, we ran separate analyses for women and men.

Examining the combined effects of the four stressor categories on mental health symptoms, our regression analyses indicated that the four stressor categories explained 15.8% of the variance in eating problems in men, $R^2 = 0.158$, $F(4, 143) = 6.71$, $p < .001$, and 50.9% of eating problems in women, $R^2 = 0.509$, $F(4, 337) = 87.50$, $p < .001$, as well as 14.7% of the variance in substance use problems in men, $R^2 = 0.147$, $F(4, 144) = 6.22$, $p < .001$, and 12.8% of substance problems in women, $R^2 = 0.128$, $F(4, 334) = 12.23$, $p < .001$. Regarding negative affect, the four stressor categories explained 44.8% of the variance in anxiety symptoms in men, $R^2 = 0.448$, $F(4, 137) = 27.83$, $p < .001$, and 38.0% of anxiety symptoms in women, $R^2 = 0.38$, $F(4, 333) = 50.92$, $p < .001$, as well as 45.8% of the variance in depressive symptoms in men, $R^2 = 0.458$, $F(4, 142) = 30.04$, $p < .001$, and 48.1% of depressive symptoms in women, $R^2 = 0.481$, $F(4, 334) = 77.47$, $p < .001$. Finally, the regression analyses indicated that the four stressor categories explained 45.5% of the variance in overall distress in men, $R^2 = 0.457$, $F(4, 133) = 27.61$, $p < .001$, and 58.5% of overall distress in women, $R^2 = 0.585$, $F(4, 311) = 109.53$, $p < .001$, as well as 28.5% of the variance in well-being in men, $R^2 = 0.285$, $F(4, 140) = 33.46$, $p < .001$, and 24.8% of well-being in women, $R^2 = 0.248$, $F(4, 335) = 11.57$, $p < .001$.

Table 4 shows the results of regression analyses in which intrapersonal stress predicted mental health symptoms in women and men. As shown in the table, and consistent with our hypothesis, intrapersonal stress significantly predicted symptoms of anxiety and eating problems in women, but contrary to our hypothesis, also predicted symptoms of anxiety and eating problems in men. Intrapersonal stress also significantly predicted symptoms of depression, overall distress, and lower well-being in both women and men. The only mental health symptoms not predicted by intrapersonal stress were substance use problems.

Table 5 displays the results of regression analyses in which we examined the extent to which interpersonal stress predicted mental health

---

**TABLE 4**

Regression Results of Intrapersonal Stress as a Predictor of Mental Health Symptoms by Gender

<table>
<thead>
<tr>
<th>Gender and symptoms</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>r</th>
<th>p</th>
<th>r (partial)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men (n = 169)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating problems</td>
<td>1.43</td>
<td>0.44</td>
<td>0.34</td>
<td>3.25</td>
<td>&lt; .001</td>
<td>.26</td>
</tr>
<tr>
<td>Substance problems</td>
<td>-0.06</td>
<td>0.47</td>
<td>-0.13</td>
<td>-0.12</td>
<td>.90</td>
<td>.01</td>
</tr>
<tr>
<td>Anxiety</td>
<td>1.98</td>
<td>0.41</td>
<td>0.41</td>
<td>4.86</td>
<td>&lt; .001</td>
<td>.38</td>
</tr>
<tr>
<td>Depression</td>
<td>1.69</td>
<td>0.40</td>
<td>0.35</td>
<td>4.21</td>
<td>&lt; .001</td>
<td>.33</td>
</tr>
<tr>
<td>Overall distress</td>
<td>4.89</td>
<td>1.36</td>
<td>0.31</td>
<td>3.59</td>
<td>&lt; .001</td>
<td>.30</td>
</tr>
<tr>
<td>Well-being</td>
<td>-1.88</td>
<td>0.50</td>
<td>-0.38</td>
<td>-3.79</td>
<td>&lt; .001</td>
<td>-.31</td>
</tr>
<tr>
<td><strong>Women (n = 379)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating problems</td>
<td>2.75</td>
<td>0.18</td>
<td>0.75</td>
<td>15.15</td>
<td>&lt; .001</td>
<td>.64</td>
</tr>
<tr>
<td>Substance problems</td>
<td>0.11</td>
<td>0.17</td>
<td>0.04</td>
<td>0.61</td>
<td>0.54</td>
<td>.03</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.78</td>
<td>0.26</td>
<td>0.17</td>
<td>3.02</td>
<td>&lt; .001</td>
<td>.16</td>
</tr>
<tr>
<td>Depression</td>
<td>1.48</td>
<td>0.22</td>
<td>0.34</td>
<td>6.75</td>
<td>&lt; .001</td>
<td>.35</td>
</tr>
<tr>
<td>Overall distress</td>
<td>5.04</td>
<td>0.63</td>
<td>0.38</td>
<td>8.04</td>
<td>&lt; .001</td>
<td>.42</td>
</tr>
<tr>
<td>Well-being</td>
<td>-1.22</td>
<td>0.22</td>
<td>-0.33</td>
<td>-5.52</td>
<td>&lt; .001</td>
<td>-.29</td>
</tr>
</tbody>
</table>

Note: r (partial) shows the correlation between Intrapersonal Stress and symptoms controlling for Interpersonal, Performance, and Financial Stress. *p < .01

**TABLE 5**

Regression Results of Interpersonal Stress as a Predictor of Mental Health Symptoms by Gender

<table>
<thead>
<tr>
<th>Gender and symptoms</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>r</th>
<th>p</th>
<th>r (partial)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men (n = 169)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating problems</td>
<td>1.02</td>
<td>0.69</td>
<td>0.15</td>
<td>1.47</td>
<td>.14</td>
<td>1.02</td>
</tr>
<tr>
<td>Substance problems</td>
<td>2.47</td>
<td>0.73</td>
<td>0.34</td>
<td>3.39</td>
<td>.001*</td>
<td>2.27</td>
</tr>
<tr>
<td>Anxiety</td>
<td>1.84</td>
<td>0.65</td>
<td>0.24</td>
<td>2.81</td>
<td>.006*</td>
<td>2.33</td>
</tr>
<tr>
<td>Depression</td>
<td>2.06</td>
<td>0.62</td>
<td>0.27</td>
<td>3.31</td>
<td>.001*</td>
<td>2.77</td>
</tr>
<tr>
<td>Overall distress</td>
<td>7.65</td>
<td>2.20</td>
<td>0.30</td>
<td>3.47</td>
<td>.001*</td>
<td>2.99</td>
</tr>
<tr>
<td>Well-being</td>
<td>0.15</td>
<td>0.77</td>
<td>0.02</td>
<td>0.19</td>
<td>.85</td>
<td>.02</td>
</tr>
<tr>
<td><strong>Women (n = 379)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating problems</td>
<td>0.18</td>
<td>0.34</td>
<td>0.52</td>
<td>0.52</td>
<td>.60</td>
<td>0.03</td>
</tr>
<tr>
<td>Substance problems</td>
<td>1.40</td>
<td>0.33</td>
<td>0.28</td>
<td>4.24</td>
<td>&lt; .001*</td>
<td>2.33</td>
</tr>
<tr>
<td>Anxiety</td>
<td>2.05</td>
<td>0.49</td>
<td>0.24</td>
<td>4.22</td>
<td>&lt; .001*</td>
<td>2.23</td>
</tr>
<tr>
<td>Depression</td>
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<td>0.41</td>
<td>0.23</td>
<td>4.57</td>
<td>&lt; .001*</td>
<td>2.24</td>
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<td>0.29</td>
<td>6.00</td>
<td>&lt; .001*</td>
<td>3.23</td>
</tr>
<tr>
<td>Well-being</td>
<td>-1.20</td>
<td>0.41</td>
<td>-0.17</td>
<td>-2.90</td>
<td>&lt; .004*</td>
<td>-.16</td>
</tr>
</tbody>
</table>

Note: r (partial) shows the correlation between Interpersonal Stress and symptoms controlling for Intrapersonal, Performance, and Financial Stress. *p < .01
TABLE 6
Regression Results of Performance Stress as a Predictor of Mental Health Symptoms by Gender

<table>
<thead>
<tr>
<th>Gender and symptoms</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>r (partial)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men (n = 169)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating problems</td>
<td>-0.45</td>
<td>0.52</td>
<td>-0.09</td>
<td>-0.86</td>
<td>.39</td>
<td>-0.07</td>
</tr>
<tr>
<td>Substance problems</td>
<td>0.31</td>
<td>0.55</td>
<td>0.06</td>
<td>0.56</td>
<td>.57</td>
<td>0.05</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.40</td>
<td>0.48</td>
<td>0.07</td>
<td>0.82</td>
<td>.41</td>
<td>0.07</td>
</tr>
<tr>
<td>Depression</td>
<td>1.23</td>
<td>0.47</td>
<td>0.21</td>
<td>2.59</td>
<td>.01</td>
<td>.17</td>
</tr>
<tr>
<td>Overall distress</td>
<td>3.17</td>
<td>1.60</td>
<td>0.17</td>
<td>1.98</td>
<td>.05</td>
<td>.17</td>
</tr>
<tr>
<td>Well-being</td>
<td>-0.77</td>
<td>0.59</td>
<td>-0.13</td>
<td>-1.31</td>
<td>.19</td>
<td>-0.11</td>
</tr>
<tr>
<td>Women (n = 379)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating problems</td>
<td>-0.48</td>
<td>0.25</td>
<td>-0.10</td>
<td>-1.90</td>
<td>.06</td>
<td>-0.10</td>
</tr>
<tr>
<td>Substance problems</td>
<td>0.05</td>
<td>0.24</td>
<td>0.01</td>
<td>0.20</td>
<td>.84</td>
<td>0.01</td>
</tr>
<tr>
<td>Anxiety</td>
<td>1.89</td>
<td>0.36</td>
<td>0.30</td>
<td>5.27</td>
<td>&lt; .001</td>
<td>0.28</td>
</tr>
<tr>
<td>Depression</td>
<td>1.25</td>
<td>0.31</td>
<td>0.12</td>
<td>4.09</td>
<td>&lt; .001</td>
<td>0.22</td>
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<tr>
<td>Overall distress</td>
<td>3.66</td>
<td>0.88</td>
<td>0.20</td>
<td>4.17</td>
<td>&lt; .001</td>
<td>0.23</td>
</tr>
<tr>
<td>Well-being</td>
<td>-0.24</td>
<td>0.31</td>
<td>-0.05</td>
<td>-0.79</td>
<td>.43</td>
<td>-0.04</td>
</tr>
</tbody>
</table>

Note. r (partial) shows the correlation between Performance Stress and symptoms controlling for Intrapersonal, Interpersonal, and Financial Stress. *p < .01

TABLE 7
Regression Results of Financial Stress as a Predictor of Mental Health Symptoms by Gender

<table>
<thead>
<tr>
<th>Gender and symptoms</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>r (partial)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men (n = 169)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating problems</td>
<td>0.17</td>
<td>0.46</td>
<td>0.04</td>
<td>0.36</td>
<td>.71</td>
<td>0.03</td>
</tr>
<tr>
<td>Substance problems</td>
<td>0.14</td>
<td>0.48</td>
<td>0.03</td>
<td>0.30</td>
<td>.76</td>
<td>0.03</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.42</td>
<td>0.43</td>
<td>0.08</td>
<td>0.97</td>
<td>.33</td>
<td>0.08</td>
</tr>
<tr>
<td>Depression</td>
<td>-0.19</td>
<td>0.42</td>
<td>-0.04</td>
<td>-0.46</td>
<td>.65</td>
<td>-0.04</td>
</tr>
<tr>
<td>Overall distress</td>
<td>0.92</td>
<td>1.44</td>
<td>0.05</td>
<td>0.64</td>
<td>.52</td>
<td>0.06</td>
</tr>
<tr>
<td>Well-being</td>
<td>-0.46</td>
<td>0.51</td>
<td>-0.08</td>
<td>-0.89</td>
<td>.38</td>
<td>-0.08</td>
</tr>
<tr>
<td>Women (n = 379)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating problems</td>
<td>-0.03</td>
<td>0.18</td>
<td>-0.01</td>
<td>-0.18</td>
<td>.85</td>
<td>-0.01</td>
</tr>
<tr>
<td>Substance problems</td>
<td>0.29</td>
<td>0.18</td>
<td>0.09</td>
<td>1.66</td>
<td>.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.28</td>
<td>0.26</td>
<td>0.05</td>
<td>1.06</td>
<td>.29</td>
<td>0.06</td>
</tr>
<tr>
<td>Depression</td>
<td>0.38</td>
<td>0.22</td>
<td>0.08</td>
<td>1.71</td>
<td>.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Overall distress</td>
<td>1.10</td>
<td>0.63</td>
<td>0.07</td>
<td>1.74</td>
<td>.08</td>
<td>0.10</td>
</tr>
<tr>
<td>Well-being</td>
<td>-0.53</td>
<td>0.22</td>
<td>-0.12</td>
<td>-2.35</td>
<td>.02</td>
<td>-0.13</td>
</tr>
</tbody>
</table>

Note. r (partial) shows the correlation between Financial Stress and symptoms controlling for Intrapersonal, Interpersonal, and Performance Stress.

Symptoms in women and men. Consistent with our hypothesis, our results revealed that interpersonal stress predicted substance use problems in both women and men, as well as depression in women. Contrary to our hypothesis, interpersonal stress also predicted depression in men. Interpersonal stress also significantly predicted anxiety, overall distress in both women and men, as well as lower well-being in women. Eating problems were not predicted by interpersonal stress in either women or men.

Table 6 displays the results of regression analyses that examined the extent to which performance stress predicted mental health symptoms. Consistent with our hypothesis, anxiety symptoms were significantly predicted by performance stress in women, but contrary to the hypothesis, not in men. Performance stress also predicted symptoms of depression and overall distress in women. Interestingly, performance stress did not significantly predict any mental health symptoms in men.

Table 7 displays regression results examining the extent to which financial stress predicted mental health symptoms. As seen in the table, financial stress was not found to significantly predict any mental health symptoms in women or men.

Help-Seeking Behavior

Table 8 shows help-seeking behavior by women and men in our study. As seen in the table, 31.1% of women and 10.7% of men reported having been diagnosed with a psychological problem or disorder at some point in their life. Women also reported higher treatment rates, with 16% of men having received professional help for a mental health problem compared to 37.5% of women. Regarding treatment providers, both women and men were most likely to seek help from psychologists, followed by counselors, general medical doctors, and then psychiatrists. Both women and men were least likely to receive help from a social worker. Regarding type of treatment received, both women and men were most likely to have received talk therapy followed by medication. Conversely, both women and men who were currently receiving treatment were more likely to be taking medication, with none of the men in our study currently receiving therapy.

Table 9 shows the mental health symptom and well-being scores for students who have sought help for a mental health problem and those who have never sought help. As hypothesized, students who have sought help reported significantly higher symptoms of anxiety, $t(535) = 8.60, p < .001$, and depression, $t(546) = 7.97, p < .001$, symptoms in women and men. Consistent with our hypothesis, our results revealed that interpersonal stress predicted substance use problems in both women and men, as well as depression in women. Contrary to our hypothesis, interpersonal stress also predicted depression in men. Interpersonal stress also significantly predicted anxiety, overall distress in both women and men, as well as lower well-being in women. Eating problems were not predicted by interpersonal stress in either women or men.
Discussion

The results of this study shed light on the stressors and mental health symptoms that college students experience and their help-seeking behavior. Consistent with previous findings, our data show that, whereas a substantial proportion of college students experience mental health symptoms that put them at risk, many still do not seek help even though it is readily available on most campuses. For example, none of the male college students in our study were currently receiving talk therapy or counseling even though over 20% of them scored in the at-risk range for overall psychological distress. In the past, college students have reported feeling uncomfortable talking with professionals, due to the feeling that their problem is “too personal to tell anyone” or because they feared what the treatment would involve (Gonzalez, Alegria, Prihoda, Copeland, & Zeber, 2011). Such misconceptions and misperceptions about mental health treatment likely continue to contribute to the relatively low levels of help-seeking behavior among college students.

Also as expected, our data suggest that significantly more women than men report seeking treatment and/or receiving a mental health diagnosis, with a relatively robust 37.5% of the women in our study reporting having sought help for a mental health problem compared to 16% of the men. This disparity may be because women

<table>
<thead>
<tr>
<th>TABLE 8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnosis, Treatment Rates, Types of Providers, and Treatments by Gender</strong></td>
</tr>
<tr>
<td>Help-seeking behaviors</td>
</tr>
<tr>
<td>History of diagnosis</td>
</tr>
<tr>
<td>Received professional help</td>
</tr>
<tr>
<td>Psychologist</td>
</tr>
<tr>
<td>Social worker</td>
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<tr>
<td>Counselor</td>
</tr>
<tr>
<td>Psychiatrist</td>
</tr>
<tr>
<td>General medical doctor</td>
</tr>
<tr>
<td>Medication</td>
</tr>
<tr>
<td>Talk therapy</td>
</tr>
<tr>
<td>Currently receiving help</td>
</tr>
<tr>
<td>Currently receiving medication</td>
</tr>
<tr>
<td>Currently receiving talk therapy</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 9</th>
</tr>
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<tbody>
<tr>
<td><strong>Mental Health Symptom Scores by Help-Seeking Behavior</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Symptoms</td>
</tr>
<tr>
<td>Eating problems</td>
</tr>
<tr>
<td>Substance problems</td>
</tr>
<tr>
<td>Anxiety</td>
</tr>
<tr>
<td>Depression</td>
</tr>
<tr>
<td>Overall distress</td>
</tr>
<tr>
<td>Well-being</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stress Scores by Help-Seeking Behavior</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Stress category</td>
</tr>
<tr>
<td>Performance</td>
</tr>
<tr>
<td>Intrapersonal</td>
</tr>
<tr>
<td>Interpersonal</td>
</tr>
<tr>
<td>Financial</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*p < .01
genuinely experience more stress and mental health symptoms than men. Consistent with such an interpretation, the women in our study reported higher levels of mental health symptoms across all categories except substance abuse. The similar levels of substance use problems reported by men and women in this study was contrary to our hypothesis and inconsistent with previous studies showing higher rates of substance use problems among men (American College Health Association, 2017; Downs et al., 2013; Downs et al., 2017). It is unclear whether the present findings indicate that men are engaging in less substance abuse or that women are engaging in more substance abuse, but it clearly will be important for researchers and practitioners to continue monitoring and addressing substance use problems in college students without assuming that men engage in higher levels of substance abuse than women. In addition to reporting higher levels of anxiety, depression, eating problems, and overall distress, the women in our study also reported higher levels of stress across all categories except financial, providing further support for the interpretation that women are more likely to seek help because they experience more problems with stress and mental health than men.

However, there is evidence that the picture may be a little more complicated. An alternative explanation for our findings is that women and men may have different attitudes toward expressing psychological distress and help seeking. Indeed, previous studies have revealed that women have a greater willingness to express their psychological and emotional distress than men (Gonzalez et al., 2005; Levinson & Ifrah, 2010; Mackenzie et al., 2006), and that attitudes toward mental health treatment in young adult men were the most negative of all groups that were tested (Gonzalez et al., 2005). Taken together, these findings suggest the possibility that stigma associated with admitting psychological distress and a need for help may play a significant role in the gender differences found in help-seeking behavior in this and other studies. Such findings also suggest that men who are experiencing significant stress and/or psychological distress may be at increased risk, relative to women, due to their apparent reluctance to seek help.

In addition to examining gender differences in stress, mental health symptoms, and help-seeking behavior, one of the purposes of this study was to add to the research literature by developing a more comprehensive understanding of the different types of stressors college students experience and the impact of those stressors on mental health. Our results suggest that the stressors experienced by college students may fall into four main categories (intrapersonal, interpersonal, performance, and financial). Importantly, intrapersonal and interpersonal stressors appear to be key variables that significantly impact a wide range of mental health symptoms for both women and men. Specifically, intrapersonal stress predicted symptoms of anxiety, depression, eating disorders, and overall distress, whereas interpersonal stress predicted anxiety, depression, substance use problems, and overall distress in both women and men. These findings are consistent with, and build upon, previous studies showing that specific intrapersonal stressors, such as body image problems (Tao et al., 2002), and specific interpersonal stressors, such as experiencing discrimination, are linked with mental health problems such as anxiety and depression (Byrd & McKinney, 2012; Whitton et al., 2013). The results are also consistent with previous work suggesting that substance use problems may be more closely linked with interpersonal rather than intrapersonal stressors (Whitton et al., 2013).

Conversely, financial stress, which has been reported by a substantial proportion of college students (American College Health Association, 2017) did not significantly impact mental health symptoms in our study for either women or men, and the impact of performance stress on mental health varied by gender. Specifically, performance stress predicted anxiety, depression, and overall distress in women but did not predict any mental health symptoms in men. One possible explanation for this is that men tend to perceive greater pressure of “quantitative demands” of work and the amount they have to get done, whereas women tend to feel a greater pressure of “qualitative or psychological demands” of work, raising the possibility that the latter kind of pressure may impact mental health more negatively than the former (Rivera-Torres, Araque-Padilla, & Montero-Simó, 2013). In addition, it is possible that women may perceive more emotional and intellectual performance demands than men in the sense that they may feel they need to work harder to prove themselves (Rivera-Torres et al., 2013). Such perceptions may be, at least in part, related to stereotype threat, which has been shown to predict lower perceived control, engagement, and self-esteem, as well as increased physiological and cognitive arousal among women in STEM fields (Casas, Petzel, & Ingalls, 2018; Murphy, Steele, & Gross, 2007). These differing
perceptions of pressure to prove one’s worth and capabilities may contribute to the more robust link between performance stress and mental health symptoms in women as compared to men.

Our findings that some types of stressors are more likely to negatively impact mental health than others and that those impacts may vary by gender have important implications for colleges and professionals concerned about the mental well-being of college students. For example, although significant (and legitimate) concerns about the cost of college and student debt have been expressed by students, families, and some researchers (Ran et al., 2016; Saías et al., 2014), our results suggest that financial pressures may not negatively affect the mental health of students. That does not mean that the financial impacts of rising costs and debt should be ignored, but it does mean that efforts to address mental health problems in college students may not benefit much from focusing on helping students to cope with financial stressors. On the other hand, our results suggest that efforts designed to help students effectively cope with or reduce their exposure to intrapersonal and interpersonal stressors could possibly lead to reductions in several types of mental health symptoms.

The notion that certain types of stressors may have more pervasive negative effects on mental health is supported by our findings that students who have received professional help for a mental health problem reported significantly more performance, interpersonal, and intrapersonal stressors than did nonhelp-seekers, whereas financial stress did not differ between help-seekers and nonhelp-seekers. Our examination of mental health symptoms and help-seeking behavior revealed significantly higher levels of depressive and anxious symptoms among help-seekers, which is consistent with previous studies showing that both depression and anxiety disorders are linked with increased help-seeking (Boereme et al., 2016; Magaard Seeralan, Schultz, & Levke Brutt, 2017). In contrast, previous studies have found that shame, low motivation to change, and denial about the severity of the problem make college students less likely to seek help for eating disorders and substance use problems (Ali et al., 2016; Hunt & Eisenberg, 2010). Our results provide support for the idea that college students are reluctant to seek help for substance use problems. However, we did find that help-seekers in our study had significantly more eating disorder symptoms than did nonhelp-seekers, suggesting that college students with eating disorder symptoms may be more willing to seek help than in the past. That said, it is not clear whether the students in our study actually sought help for eating problems, as opposed to seeking help for common comorbid problems such as depression or anxiety (Fairburn & Harrison, 2003).

This study was limited by a sample that had disproportionately more women and younger students when compared to the overall college student population in the United States. The study was also limited by a reliance on self-report, which might have resulted in the data being affected by response bias. In addition, although a p value of < .01 was used to determine significance and many of the results were significant at the p < .001 level, the relatively large number of analyses conducted increased the risk that some of the significant findings were due to chance. Despite those limitations, the results of this study add to the burgeoning research literature showing that college students are at relatively high risk for experiencing a range of stressors and mental health symptoms, and that many who are having problems do not seek help even when it is readily available. Such findings suggest that it is time for colleges to consider new ways of encouraging students who are having problems to access help. One way to do so would be to conduct regular population-based screenings of students for mental health problems and/or stress and provide information about campus resources for those who screen positive (Downs et al., 2013; Downs et al., 2017; Kim, Coumar, Lober, & Kim, 2011). Such resources might include traditional referrals to a campus counseling center, referrals to other campus support services, and/or self-help information that could be utilized by students to reduce the impact that stressors or mental health symptoms have on their ability to function.

Our findings also highlight the need for colleges to more intentionally identify and target the stressors that significantly impact student mental health. For example, whereas it may be fairly common for colleges to provide some programming and support around body image problems, it is likely less common for colleges to do so around other interpersonal stressors such as low self-esteem or lack of confidence. Similarly, although colleges may be increasingly aware of the need to directly address discrimination on campuses, it seems likely that many colleges do not specifically target other interpersonal stressors such as relationship problems with family, coworkers, and significant others. Although colleges cannot reasonably be
expected to address all potential sources of student stress, this study provides information that could allow for a more proactive approach than is currently employed on many campuses. For instance, intentional campus-wide efforts to educate students, faculty, and staff about the different types of stressors and symptoms students experience could potentially reduce stigma and increase awareness, referrals to appropriate campus resources, and help-seeking behavior. In addition, student affairs professionals could adjust their wellness promotion programming and student support services to more intentionally target the stressors identified in this and other studies as negatively impacting student mental health.

References


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Many humans develop strong emotional bonds to their pets. Some have argued that pets have the ability to function as a surrogate child to families (Alexander, 1987). Similarly, Hume (1978) explained that humans can connect with animals as if they were a fellow human acquaintance, friend, or family member. The purpose of the present study was to analyze the strength of the relationship that humans have with their pets by presenting participants with moral dilemmas in which they were asked to save their pet or a human (infant, 40-year-old, or 80-year-old) from death. We hypothesized that the older the human in the scenario, the more likely participants would be to choose saving their pet. We also hypothesized that women were more likely than men to save the pet than the human. A 3 x 2 mixed Analysis of Variance was performed to analyze the data. Our findings suggest that both age and sex influence people’s saving preference. Although most participants indicated a preference for saving humans over pets, participants were more likely to save their pet as human age increased ($p < .001$), and women were more likely than men to save the pet ($p = .037$). The findings from this study shed light on human-animal relationships, suggesting that some people value their pet's life over human lives.

**ABSTRACT.** The relationship between humans and animals is a bond that resembles the relationship between humans and family members. To better understand this relationship, we presented 122 undergraduates (18- to 22-year-olds) with 3 moral dilemmas in which they were forced to save their pet or a human (infant, 40-year-old, or 80-year-old) from death. We hypothesized that the older the human in the scenario, the more likely participants would be to choose saving their pet. We also hypothesized that women were more likely than men to save the pet than the human. A 3 x 2 mixed Analysis of Variance was performed to analyze the data. Our findings suggest that both age and sex influence people’s saving preference. Although most participants indicated a preference for saving humans over pets, participants were more likely to save their pet as human age increased ($p < .001$), and women were more likely than men to save the pet ($p = .037$). The findings from this study shed light on human-animal relationships, suggesting that some people value their pet’s life over human lives.
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most inclined to save the younger individuals in the scenario. Similarly, researchers found that, when there was a limited supply of a vaccine, participants opted to supply the vaccine to younger individuals rather than older individuals (Li et al., 2010).

Although the age of the character influences moral decision making, participants’ sex also plays a significant role. Research has supported the notion that women tend to elicit a stronger emotional response when reading moral dilemmas (Bampton & Maclagan, 2009; Friesdorf, Conway, & Gawronski, 2015). For example, in a retail scam scenario, women deemed it unacceptable to deceive customers, whereas men thought this to be appropriate behavior (Bampton & Maclagan, 2009). The researchers concluded that women have a “care” orientation, meaning that they tend to care more about a human’s well-being.

In addition to exploring the effects of age and sex on moral decision making, researchers have explored the bonds between humans and their pets. Previous research found that, when participants were presented with a dilemma in which there was a limited supply of a drug, nearly all the participants said that they would give their pet, rather than a stranger, the drug under at least one circumstance (Cohen, 2002). In a related study, researchers examined the likelihood that one would save an animal’s life over a human life (Topolski et al., 2013). Specifically, Topolski et al. (2013) manipulated the degree of relatedness to the participant (i.e., sibling, grandparent, close friend, distant cousin, hometown stranger, and foreign tourist) and measured the effect of relatedness on participants’ likelihood of saving a human or their pet. The results indicated that participants were far more likely to save their own pet when the closeness of the given individual became less personal (i.e., a foreign tourist). Moreover, women were more likely to save their own pet than men, but only for nonimmediate family members. Perhaps this is not a surprising finding because pets tend to elicit strong empathy levels, especially for women (Angantyr, Eklund, & Hansen, 2011). Interestingly, previous research has found that women interact with their pets in a more “motherly way” than men (Prato-Previde, Fallani, & Valsecchi, 2006).

Although Topolski et al. (2013) and Cohen (2002) presented moral dilemmas in which human and animal lives were at risk, their studies lacked scenarios testing the effect of the age of the human on moral decision making. Also, although Kawai et al. (2014) investigated how age affects the likeliness to save other humans, their study did not include pets. To address this gap in the literature, we conducted a study to examine how the likelihood of saving a pet over a human is influenced by participant sex and the age of the human in the scenario. All participants read three scenarios, each with a different human age (i.e., infant, 40-year-old, and 80-year-old). We predicted that, as the age of the person increased, participants would be more likely to save their pet over the human. In addition, we predicted that women would choose to save their pet over the human more often than men.

**Method**

**Participants**

One hundred twenty-two 18- to 22-year-old undergraduates (90 women, 31 men, 1 unknown) enrolled at a small liberal arts college in the northeastern United States participated. Eighty-four percent of the participants owned pets. We recruited participants by using Sona-Systems, and they received partial course credit for their participation.

**Design**

We used a 3 (age of person in scenario: infant, 40-year-old, or 80-year-old) x 2 (sex of participant: male or female) mixed factorial design. The dependent variable was saving preference.

**Materials and Procedure**

Before conducting the study, we received approval from the Stonehill College institutional review board (#2016-17-03). Upon entering the laboratory room, participants were greeted and presented with an informed consent form to sign. Then, participants were brought into separate rooms where they had as much time as they needed to complete the study. Participants received three different scenarios, which were modified versions of a scenario used in previous research (Topolski et al., 2013). We presented the following scenario:

If you do not own a pet, imagine you do own a pet for all the following scenarios. A bus is traveling down a busy street. Your pet runs out in front of the bus. Unfortunately, at the same time an infant crawls out in front of the bus. Neither your pet nor the infant has enough time to get out of the way of the bus. It is clear given the speed of the bus, it will kill whichever one it hits. You only have time to save one. Who would you save?
Using a 4-point scale (1 = definitely save the infant, 2 = probably save the infant, 3 = probably save my pet, and 4 = definitely save my pet), participants indicated if they would save the human or their pet. The scenario was then presented two more times, but “infant” was replaced with “40-year-old” or “80-year-old.” We counterbalanced the order in which the ages were presented, and participants were randomly assigned to the orders.

After completing the scenarios, participants completed a 5-item questionnaire that consisted of questions about their sex, pet ownership, and what they imagined while reading the scenarios. Finally, we debriefed and dismissed the participants.

Results

We excluded two participants from the analysis. One participant declined to answer the sex question, and one participant did not respond to one of the scenarios. A 3 x 2 mixed Analysis of Variance was performed on the remaining participants’ scores to determine if the age of the human presented in the scenario and the sex of the participant influenced saving preference. Our data violated the assumption of sphericity. Therefore, we used the Greenhouse-Geisser correction. Table 1 shows the pattern of means. As predicted, there was a significant main effect of age $F(1.88, 221.22) = 56.02, p < .001$, partial $\eta^2 = 0.322$ (see Figure 1). Participants’ likelihood of saving the pet increased as the age of the human increased. Pairwise comparisons using the Bonferroni adjustment revealed that all the differences among the three ages were statistically significant ($p < .005$). There was also a significant main effect of sex, $F(1, 118) = 4.44, p = .037$, partial $\eta^2 = 0.036$. Overall, women were more likely to save the pet than the human. The interaction between sex and the age of human was not significant, $F(1.88, 221.22) = 1.24, p = .291$, partial $\eta^2 = 0.01$.

In addition to the above analysis, we calculated saving percentages. If participants chose either “definitely save the human” or “probably save the human,” they received a 0. If participants chose either “definitely save my pet” or “probably save my pet,” they received a 1. Then, using these scores, we computed saving percentages for each age category. Overall, participants chose to save the pet over the 80-year-old 40% of the time. Participants chose to save the pet over the 40-year-old 33% of the time. Finally, they chose to save the pet over the infant only 6% of the time.

Discussion

The results supported both hypotheses. Although most participants indicated a preference for saving humans over pets, participants’ saving preference was significantly influenced by the age of the human in the scenario. As the age of the human increased, participants were more inclined to save their pet over the human. Additionally, our data supported the prediction that women would be more likely to save their pet than men, but the effect size was small.

Overall, the current findings fit well with past research on moral judgments involving pets and humans. Topolski et al. (2013) manipulated degree of relatedness and found that participants were far more likely to save their own pet when the closeness of the given individual became less personal. Similarly, we found that participants were more likely to save their own pet as the age of the human increased. A comparison of the two studies indicates that the infant in the current study elicited a similar saving percentage as the sibling in Topolski et al., and the 80-year-old in the current study elicited a similar saving percentage as the foreign tourist in Topolski et al. Furthermore, in both studies, women

### Table 1

<table>
<thead>
<tr>
<th>Age</th>
<th>Men (M, SD)</th>
<th>Women (M, SD)</th>
<th>All (M, SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>1.26 (0.58)</td>
<td>1.45 (0.67)</td>
<td>1.40 (0.65)</td>
</tr>
<tr>
<td>40-year-old</td>
<td>1.71 (0.82)</td>
<td>2.14 (0.96)</td>
<td>2.03 (0.94)</td>
</tr>
<tr>
<td>80-year-old</td>
<td>1.97 (0.98)</td>
<td>2.34 (0.98)</td>
<td>2.24 (0.99)</td>
</tr>
<tr>
<td>All</td>
<td>1.65 (0.69)</td>
<td>1.97 (0.77)</td>
<td>1.88 (0.94)</td>
</tr>
</tbody>
</table>

### Figure 1

Saving preference as a function of participant sex and age of human in scenario.
were more likely to choose to save the pet than men.

These results are not surprising because previous research has demonstrated effects of both age and sex on saving preference. Our data align with the “granny dumping” concept (Kawai et al., 2014) because participants were more likely to abandon the human as age increased. Alexander (1987) suggested that participants often have more empathy for younger children because they tend to be more helpless. Therefore, the infant in the moral dilemma might have elicited a great deal of sympathy due to the infant’s helpless demeanor. Furthermore, Angantyr et al. (2011) demonstrated that, when a pet and human are in danger, the pet tends to elicit at least as much empathy as the human. Drawing from these results, it is easy to understand why, in every age group, at least one participant chose to save the pet.

In addition to age, participant sex played a small role in the moral decision-making process. The data we gathered aligned with Prato-Previde et al. (2006) in that women may have a more parental-like bond and maternal instinct with their pet than men do, which may lead to women’s tendency to grieve more over the loss of a pet than men would (Wrobel & Dye, 2003). However, it is not surprising that, regardless of participant sex, all participants were more likely to choose the human over the pet, as the loss of a younger life elicits more grief.

Our research had some limitations. First, we relied on a convenience sample of college-aged participants. And although we had a large sample size, we tested three times as many women as men, and we did not account for participants’ ethnic or racial group. Overall, these sampling issues threaten the external validity of our study. Second, although we measured pet ownership, our sample of nonpet owners was too small, so we could not analyze these data. Last, we used hypothetical moral dilemmas to study participants’ moral decision-making. This has been the standard methodology for examining moral cognition, but recent research has suggested that participants’ responses to these moral dilemmas may not correlate with how they would act in real-life situations (Bostyn, Sevenhant, & Roets, 2018).

To address some of these limitations, future studies could rely on stratified random sampling to recruit an equal number of men and women from a variety of settings. Also, future studies should compare pet owners to nonpet owners. Moreover, researchers should manipulate degree of relatedness (i.e., family member, stranger) and age in the same study. For example, participants could be asked to choose between saving their pet or their infant, 40-year-old parent, 80-year-old grandparent, or strangers of the same ages. An additional study could present both the human and the pet in the scenario as “strangers” to see how that affects participants' decision making. Finally, future research should replace hypothetical moral dilemmas with more realistic situations so that participants’ actual moral behavior is measured (Bostyn et al., 2018).

In summary, our research indicated that both age and sex influence people’s saving preference. Understanding the influence that human age has in moral dilemmas is an important factor when considering the bonds that humans have with animals. Although the human and pet bond is very strong, the value that humans hold toward younger individuals outweighs that of pets. Furthermore, our data also suggests that sex plays a role in the bonds that people have with their pets. Although most participants chose to save the human over the pet, women were more likely to choose to save the pet than men. Future studies should extend these findings to real-world settings to improve our understanding of moral behavior.

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The Effects of Age and Sex on Saving Pets | Malia, Bohrmann, and Poirier

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analysis, and a rough draft of this article. She was a curious
and passionate student, and this project would not have been
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The Size Congruity Effect in Visual Search: Further Evidence for Late Interaction
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ABSTRACT. In traditional numerical comparison tasks, participants view 2 digits that have different numerical and physical sizes, and select the digit that is numerically (or physically) smaller (or larger). Responses are typically faster when the numerical and physical sizes are congruent (e.g., the numerically larger item is also physically larger than the other item) than when they are incongruent; this is the size congruity effect (SCE). The SCE reveals that numerical and physical sizes interact, but there is currently disagreement about whether the interaction occurs early or late in mental processing. Recent studies have revealed an SCE in visual search for multiple (i.e., more than 2) search items. In one of these studies, search was slower for participants who were instructed to search for the item with unique numerical size than for participants who were instructed to search for the item with unique physical size. In our experiment, we primed participants in the first block to search for the item with unique physical size. The early interaction model predicts relatively fast search in the second block, but the late interaction model predicts relatively slow search in the second block. Results from the second block were relatively slow, $F(1, 13) = 96.40$, $p < .001$, $\eta_p^2 = .88$, thereby supporting the late interaction model, which is consistent with a growing number of studies that also support the late interaction model.

In numerical comparison tasks (e.g., Besner & Coltheart, 1979), participants view two numerals that have different numerical and physical sizes, and then select the numeral that is numerically (or physically) smaller (or larger). The typical result is a size congruity effect (SCE), wherein responses are faster when the numerical and physical sizes are congruent (e.g., the numerically larger item is also physically larger than the other item) than when they are incongruent (Santens & Verguts, 2011).

Although the SCE shows that mental representations of numerical and physical size must interact, there remains disagreement about where the interaction occurs (Arend & Henik, 2015). In the early interaction model (Reike & Schwarz, 2017; Schwarz & Heinez, 1998), numerical and physical sizes are encoded into a single mental representation, and proceed together through the entire mental processing sequence. In the late interaction model (Faulkenberry, Cruise, Lavro, & Shaki, 2016; Santens & Verguts, 2011), numerical and physical size inhabit separate mental representations that remain segregated from each other throughout the early stages of processing, and only interact at the decision stage. In this article, we used the SCE in visual search to test predictions made by the early and late interaction models.

The SCE in Visual Search
Risko, Maloney, and Fugelsang (2013) argued that the traditional numerical comparison task is influenced by attention. Because visual search is a widely used method for investigating the role of attention in finding a single target item among several nontarget distractors, Risko et al.’s argument implies that the traditional two-item
numerical comparison task is simply a visual search with one target and just one distractor. Later work verified that the SCE occurs in visual search with multiple numerals (Krause, Bekkering, Pratt, & Lindemann, 2017; Sobel & Puri, 2018; Sobel, Puri, & Faulkenberry, 2016); participants can find a target numeral more quickly when its numerical and physical sizes are congruent than when they are incongruent. Although the SCE in visual search has been observed in three different studies, the fact that incongruity between a target’s numerical and physical size can influence visual search remains surprising. After all, visual search is typically presumed to be guided by visual features such as physical size but not by a character’s semantic associations such as numerical size (Wolfe & Horowitz, 2004). The presence of the SCE in visual search can be explained more readily in terms of the late interaction model than the early interaction model.

In visual search, participants first select one item from among several in the visual field, then examine the selected item to decide if it is the target; thus, selection is relatively early in the visual processing sequence, and decision is relatively late. In the early interaction model, numerical and physical size are fused together into a single mental representation throughout the entire visual processing sequence (i.e., both selection and decision). In the late interaction model, numerical and physical size are segregated from each other during the early stages (i.e., selection), then numerical and physical size interact during the decision stage. Thus, according to the late interaction model, but not the early interaction model, because numerical and physical size are segregated from each other during selection, the selection stage can be guided by salient visual features such as physical size without any influence from semantic features such as numerical size. Furthermore, because numerical and physical size interact in the decision stage, incongruity between numerical and physical size has the opportunity to influence the decision stage only after attention has already been directed to a display item. As a result, the late interaction model can explain why the size congruity influences visual search even though numerical size is unlikely to be a guiding feature (i.e., does not affect selection).

Using Priming to Encourage Search for Physical Size

Whereas the late selection model can explain how the SCE can occur in visual search, we wanted to try to understand another surprising result from Sobel et al. (2016). In every display, the target was numerically and physically unique, which enabled Sobel et al. to use the same visual displays in both experiments while manipulating just the instructions (i.e., find the numerically unique item in one experiment, and find the physically unique item in the other experiment). Sobel et al. found that participants who were instructed to search for a three-digit target numeral based on its numerical size responded more slowly than other participants who were instructed to search for the target based on its physical size. That is, participants instructed to search for the item with unique numerical size failed to realize that they could have responded faster if instead they searched for the item with the unique physical size. We wondered why participants failed to realize that they could have just searched for the physically unique item, thereby responding more quickly.

Perhaps if participants were primed to search for the item with unique physical size, they could then continue to use physical size to locate the target even when instructed to search for the item with unique numerical size. After all, visual priming can encourage participants to attend to locations (Chun & Nakayama, 2000; Olds & Fockler, 2004) and visual features (Sobel, Gerrie, Poole, & Kane, 2007) that enable them to search more quickly than if they had not been primed, even without any explicit instructions to do so. With that in mind, we thought that participants could be primed by instructing them to search for physical size in one experimental block, and then instructing them to search for numerical size in the second block.

We blended two experiments from Sobel et al. (2016) into one, instructing participants to search for the physically unique item in the first block, and for the numerically unique item in the second block. The early and late interaction models make two different predictions. If numerical and physical size are fused into a single mental representation during the selection stage as in the early interaction model, in the second block participants should be able to flexibly deploy attention from one feature (numerical size) to another feature (physical size) in the same mental representation. As a result, participants instructed to attend to numerical size in the second block should be able to deploy their attention to the physically unique item, thereby responding as quickly as they had responded in the first block. On the other hand, if numerical and physical size are segregated from each other in two separate mental representations during the
selection stage as in the late interaction model, participants should be less able to flexibly deploy their attention between numerical and physical size. As a result, participants should search for the numerically unique item as instructed in the second block, thereby responding more slowly than in the first block.

**Hypotheses and Experimental Design**

As mentioned previously, it was surprising that participants in Sobel et al. (2016) who were instructed to search for numerical size failed to realize that they could have completed the task much faster if they had searched for the item with unique physical size. Accordingly, we hypothesized that priming participants to search for the physically unique items in the first block would make them realize that they could continue relying on physical size in the second block. Thus, we expected responses to be as fast in the second block as in the first, which would provide support for the early interaction model.

As in Sobel et al. (2016), we chose to elicit a localization judgment (i.e., indicate whether the target is on the right or left side of the display) rather than the better-known detection judgment (i.e., indicate whether the target is present or absent) due to methodological problems associated with detection. For example, in target-present trials, participants use a different decision criterion for terminating search than in target-absent trials (Chun & Wolfe, 1996). As a result, the experimenter must analyze the results from target-present and target-absent trials separately, thereby reducing statistical power. Localization is a widely used method for avoiding the problems associated with detection (Dukewich & Klein, 2009).

Visual search researchers typically manipulate the number of items in the search display because the slope of response times (RT) as a function of the number of display items indicates search efficiency (Wolfe, 1998). In the theoretical extreme, RT that is flat across varying number of display items shows that participants can process all the display items at one time in parallel, whereas steep slopes show that each display item must be processed serially. Physical size but not numerical size is typically presumed to be a guiding feature (Wolfe & Horowitz, 2004), such that a guiding feature is one that enables participants to reduce the range of display items through which search proceeds. Thus, searching for physical size should yield relatively flatter RT functions than searching for numerical size. Because the early selection model but not the late selection model predicts that the first block should prime participants to search for physical size in the second block, the early selection model predicts that slopes of RT as a function of the number of display items should be as flat in the second block as in the first, whereas the late interaction model predicts that slopes should be steeper in the second block than in the first.

**Method**

We obtained permission to carry out the experiment from our university’s Institutional Review Board. All participants were treated according to the ethical guidelines stipulated by the American Psychological Association (2017). The title of our IRB proposal was *The Interaction Between Perception and Cognition in Visual Search*, proposal number 18-009. To determine the appropriate sample size for the critical experiment, we carried out a pilot experiment to estimate the effect size (ES).

**Pilot Experiment**

The pilot experiment was intended to find an appropriate sample size to reliably detect an RT difference between attended feature conditions. As mentioned previously, Sobel et al. (2016) manipulated attended feature (i.e., attend to physical size and attend to numerical size) between subjects, whereas in our critical experiment we intended to expose all participants to both levels of attended feature. Thus, when designing the pilot experiment, we wanted to expose all participants to both levels of attended feature as in the critical experiment. However, we hypothesized that instructing participants to attend to physical size in the first block would eliminate RT differences between blocks. Because Sobel et al. (2016) manipulated attended feature between subjects, participants who were instructed to attend to numerical size had not been primed by previously attending to physical size. To replicate the lack of priming when attending to numerical size, we instructed participants in our pilot experiment to attend to numerical size. Since Sobel et al. (2016) manipulated attended feature between subjects, participants were exposed to both attended feature conditions just as in the critical experiment, but in
the pilot the block order was reversed to eliminate the priming effect due to attending to physical size.

A total of 16 students (13 female, three male) from a midsized university in the midsouth between the ages of 19 and 57 ($M = 24.00, SD = 9.51$) participated in the pilot experiment in exchange for course credit. To calculate ES in the pilot experiment, we divided the mean RT difference between blocks by the standard deviation pooled across blocks (Bausell & Li, 2002). The mean RT when participants were instructed to attend to numerical size was 1016.81 milliseconds, and when they were instructed to attend to physical size the mean RT was 552.68 milliseconds. The pooled standard deviation was 354.80 milliseconds, so the resulting ES was 1.31. To be conservative, we rounded the observed ES from 1.31 down to 1.25, which appears in ES tables for paired $t$ tests in Bausell and Li. Accordingly, an ES of 1.25 in the critical experiment would require a minimum of 9 participants to achieve a power of 80% at an alpha of 0.05.

### Participants

A total of 17 students (14 female, three male) from a midsized university in the midsouth between the ages of 18 and 25 ($M = 21.10, SD = 1.90$) participated in the critical experiment in exchange for course credit. Students in a wide variety of psychology courses may earn credit for participating in experiments, at the discretion of the professor. To participate, students are directed to an online scheduling system. Every student who made an appointment on the online system was selected to participate in the experiment. Researchers who carry out visual search experiments do not customarily gather any information about their participants’ race and ethnicity, primarily because these factors are not typically presumed to systematically influence basic visual processing. To be consistent with the visual search literature, we did not record our participants’ racial or ethnic background.

### Apparatus

A custom-written visual search program written in Xojo basic running on a MacBook laptop presented the visual search stimuli and gathered the RTs.

### Stimuli

Each search display contained a three-digit target number and 4, 6, or 8 three-digit distractor numbers. All the search items were arranged on an imaginary circle with a center marked with an X. For each search item, the hundreds digit was a 2 or 3 (numerically small) or 8 or 9 (numerically large). The tens and units digits were randomly selected from the digits between 0 and 9. At a viewing distance of 60 cm, the physically small numerals were $0.61 ^\circ \times 1.21 ^\circ$ tall, and the physically large numerals were $0.92 ^\circ \times 1.84 ^\circ$ tall. To reduce shape differences between digits, we constructed all digits from line segments, as can be seen in the screenshots in Figure 1. In each display, the target was numerically and physically unique. For example, if the distractors’ hundreds digits were 8s and 9s, the target’s hundreds digit was a 2 or 3. Also, if the distractors were physically large, the target was physically small. The target appeared in one of four quadrants (upper right, lower right, upper left, or lower left).

### Procedure

The experiment began with participants reading instructions presented on a series of screens; each screen advanced to the next when participants clicked a button labeled “next.” After reading the instructions, participants were presented with a series of visual displays. Each display remained visible until participants reported the target’s location by pressing one of two keys. To indicate that the target was on the right side of the display, they pressed the “/” key, and to indicate that it was on the left, they pressed the “z” key. The time between the onset of the display and the participants’ keypress was recorded as their RT for that trial.

When participants pressed the key that indicated

---

**FIGURE 1**

<table>
<thead>
<tr>
<th>Numerically large target</th>
<th>Numerically small target</th>
</tr>
</thead>
<tbody>
<tr>
<td>359 395 242 207 961</td>
<td>395 319 224 294 922</td>
</tr>
<tr>
<td>893 259</td>
<td>259 893</td>
</tr>
<tr>
<td>343 242</td>
<td>242 343</td>
</tr>
<tr>
<td>324 257</td>
<td>257 324</td>
</tr>
<tr>
<td>220 x 281</td>
<td>x 281 220</td>
</tr>
<tr>
<td>391 914</td>
<td>914 391</td>
</tr>
<tr>
<td>335 914</td>
<td>914 335</td>
</tr>
<tr>
<td>856 934</td>
<td>934 856</td>
</tr>
<tr>
<td>884 953</td>
<td>953 884</td>
</tr>
</tbody>
</table>

Stimulus arrays representing each display size (five, seven, and nine items) as well as each of the four target size conditions. Although all stimuli were white against a black background, we reversed the numbers’ brightness so they could be seen on white paper. Numerical and physical sizes are congruent in the upper left and lower right displays, and incongruent in the upper right and lower left displays.
the wrong side of the display, the program paused for one second, during which the word “Incorrect” appeared in the center of the screen.

In the first block, participants were instructed to find the item that was either physically larger or smaller than all the other items. When the first block ended, the program invited participants to take a short break for as long as they wished, then to click a button labeled “Continue” when they were ready to begin the second block. During the break, participants were instructed to search for the item that was either numerically larger or smaller than all the other items for the remainder of the experiment. Because the target was numerically and physically unique in every display, the displays were the same in both blocks.

In each block, participants were exposed to every combination of target’s numerical size, target’s physical size, target quadrant, number of display items (five, seven, or nine), and target’s hundreds digit (2 or 3 for numerically small targets, 8 or 9 for numerically large targets) in random order for a total of \((2 \times 2 \times 4 \times 3 \times 2 =)\) 96 experimental trials in each block. In addition, the first six trials overall and the first six trials after the break were practice, for a total of \((6 + 96 + 6 + 96 =)\) 204 trials, requiring about 15 minutes to complete.

**Results**

The results from two participants were excluded from analysis because their mean RTs were greater than the mean of the other participants’ RTs plus two standard deviations. The mean correct RTs for the remaining participants (depicted in Figure 2 and summarized in Table 1) were analyzed in a four-way Analysis of Variance with the number of display items, attended feature, numerical size, and physical size as within-subjects factors. Because the early interaction model predicts that RTs should be just as fast in the second block when participants attended to numerical size as in the first block when they attended to physical size, whereas the late interaction model predicts that RTs should be slower in the second block than in the first, the most relevant result was the main effect of attended feature. Furthermore, the early interaction model predicts that the slope of RT as a function of the number of display items should be the same in both blocks whereas the late interaction model predicts that RT slopes should be steeper in the second block. Thus, the second most relevant result was the interaction between attended feature and number of display items. Finally, given that the presence of an SCE in visual search supports the late selection model, the interaction between numerical and physical size indicates whether the SCE was present. In our description of the results below, we present the most relevant results first, followed by results that were peripheral to the early and late interaction models.

**Search Speed and Slope**

We had hypothesized that instructing participants to attend to physical size in the first block would eliminate the RT difference between attended feature conditions. Our hypothesis was not supported. The main effect of attended feature,
Error bars illustrate 95% confidence intervals (Loftus & Masson, 1994).

attended feature, numerical size, and physical size, here we collapsed across all three levels of the number of display items.

To clarify the two-way interaction between numerical size and physical size, and the three-way interaction between attended feature, numerical size, and physical size, here we collapsed across all three levels of display size.

Because the two-way interaction between numerical and physical size is not readily apparent in Figure 2, we collapsed across all three levels of display size in Figure 3. The interaction between numerical size and physical size, F(1, 14) = 50.06, p < .001, η² = .79, shows that responses were faster when numerical and physical sizes were congruent than when they were incongruent. As can be seen in Figure 3, the SCE appears to be larger when participants attended to numerical size in the second block than when they attended to physical size in the first block; there is a clear cross-over interaction when participants attended to numerical size but not when they attended to physical size. The larger SCE when participants attended to numerical size than when they attended to physical size was confirmed by the three-way interaction between attended feature, numerical size, and physical size, F(1, 14) = 56.88, p < .001, η² = .81. Simple interaction analysis verified that the two-way interaction between physical size and numerical size was larger when participants attended to numerical size in the second block, F(1, 14) = 53.71, p < .001, η² = .79, than when they attended to physical size in the first block, F(1,14) = 4.19, p = .060, η² = .23.

Size Congruity Effect

Because the two-way interaction between numerical and physical size is not readily apparent in Figure 2, we collapsed across all three levels of display size in Figure 3. The interaction between numerical size and physical size, F(1, 28) = 11.40, p < .001, η² = .22, shows that the slopes of RT as a function of the number of display items were steeper when participants attended to numerical size in the second block than when they attended to physical size in the first block. The mean slopes were 37 ms/item when participants attended to numerical size, 12 ms/item when participants attended to physical size.

FIGURE 3

<table>
<thead>
<tr>
<th>Physical size</th>
<th>Numerical size</th>
</tr>
</thead>
<tbody>
<tr>
<td>physSmall</td>
<td>numSmall</td>
</tr>
<tr>
<td>physBig</td>
<td>numBig</td>
</tr>
</tbody>
</table>

To clarify the two-way interaction between numerical size and physical size, and the three-way interaction between attended feature, numerical size, and physical size, here we collapsed across all three levels of the number of display items. Error bars illustrate 95% confidence intervals (Loftus & Masson, 1994).

Results Peripheral to the Early and Late Interaction Models

The main effect of physical size, F(1, 14) = 8.61, p = .012, η² = .40, shows that search was faster for physically large targets compared to physically small targets. As can be seen in Figure 3, this effect appears to be driven primarily by responses in the first block, when participants attended to physical size. Because all digits were made from white line segments against a black background, physically larger targets were brighter and, therefore, captured attention more than physically smaller and dimmer targets (Braun, 1994; Nothdurft, 2006; Proulx, 2007; Proulx & Egeth, 2008). Apparently, the participants’ top-down intention to search for physical size combined with the bottom-up salience of the physically large items enabled them to find the larger items more quickly than the smaller items (Kiss & Eimer, 2011). Although the main effect of physical size is primarily driven by responses in the first block (see Figure 3), responses in the second block for numerically and physically small targets that were slower compared to numerically and physically large targets also seems to contribute. In turn, slow responses for numerically and physically small targets in the second block seem to result from slow responses for numerically and physically small targets for displays containing five items, as can be seen in Figure 2. This data point seems to be anomalous and we have no explanation for why it is slow. Not only does it contribute to the main effect of physical size, but it also seems to have induced an unexpected four-way interaction.

There was a significant four-way interaction between the number of display items, attended feature, numerical size, and physical size, F(2, 28) = 11.71, p < .001, η² = .47. A four-way interaction
can be difficult to interpret. We think it indicates that the simple three-way interaction between the number of display items, numerical size, and physical size when participants attended to numerical size was larger than the simple three-way interaction when participants attended to physical size. This is not to say that the overall three-way interaction was significant (it was not, \( p = .37 \)), but rather that the difference between the simple three-way interactions was significant. As can be seen in Figure 2, the three-way interaction when participants attended to numerical size seems to indicate that RTs were steeper for incongruent targets than for congruent targets. In turn, the flatter slopes for congruent targets seems to be driven primarily by the slow RT for numerically and physically small targets when there were five display items. As already mentioned, we have no explanation for this anomalous data point, and thus we believe the four-way interaction is itself anomalous. None of the other main effects or interactions were significant, all \( ps > .05 \).

**Discussion**

Responses were slower during the second block than during the first block. Apparently, the fast search during the first block failed to prime participants to search for the physically unique item during the second block. This does not support our hypothesis, but it does support the late interaction model, which is consistent with a growing number of studies that are incompatible with the early interaction model (Antoine & Gevers, 2016; Arend & Henik, 2015; Cohen Kadosh, Gevers, & Notebaert, 2011; Faulkenberry et al., 2016; Namdar, Ganel, & Algom, 2018; Santens & Verguts, 2011; Sobel, Puri, Faulkenberry, & Dague, 2017). Nevertheless, our failure to prime participants to attend to physical size is inconsistent with previous studies that did manage to prime participants to attend to locations and features that would optimize search efficiency (Chun & Nakayama, 2000; Olds & Fockler, 2004; Sobel et al., 2007). Perhaps visual priming can induce attention to disengage from a visual location or feature but cannot induce attention to disengage from a conceptual feature such as numerical size. Future research is needed to find out why participants are less able to disengage their attention from a conceptual feature compared to a visual feature or if an alternative explanation better explains our failure to prime participants to attend to physical size when instructed to attend to numerical size.

Not only were responses slower in the second block, but the slopes of RT as a function of the number of display items were also steeper. In visual search experiments, the slope of RT as a function of the number of display items is typically interpreted as an index of search efficiency (Wolfe, 1998), with flat slopes indicating relatively efficient search and steeper slopes indicating relatively inefficient search. The flat slopes in the first block suggest that participants could rely on the visually salient physical size to segregate the target from the distractors, whereas the steeper slopes in the second block suggest that participants serially processed more than just one item before responding. This is consistent with Wolfe and Horowitz’s (2004) argument that semantic associations are not guiding features in visual search and also shows that numerical and physical inhabit different mental representations during selection stage, as in the late selection model but not the early selection model.

Another result that deserves notice is the asymmetrical SCE, which was larger when participants searched for the item with unique numerical size than when they searched for the item with unique physical size. Although this asymmetry replicates previous studies (Sobel et al., 2016; Sobel & Puri, 2018), its cause remains unclear. One possibility is that numerical and physical size are processed at different speeds. Whereas physical size can be directly extracted from a visual stimulus, determining a digit’s numerical size requires the extra step of connecting the symbol to its associated numerical size in memory (Lupyan, Thompson-Schill, & Swingley, 2010). Thus, incongruent physical size has more of an opportunity to interfere with numerical size than vice versa, giving rise to a larger SCE for participants instructed to search for the numerically unique item (Schwarz & Ischebeck, 2003).

However, one problem with the processing speed explanation for the asymmetrical SCE is that our results invert the asymmetry in Schwarz and Ischebeck (2003). That is, responses were faster and the SCE was smaller when participants attended to physical size in our experiment, but when participants attended to numerical size in Schwarz and Ischebeck’s. Our results imply that physical size is processed more quickly whereas theirs suggest that numerical size is processed more quickly. An alternative possibility from the classic word-color Stroop (1935) literature emphasizes the compatibility between the attended feature and the task (Blais & Besner, 2006). The traditional Stroop task entails identification (of the target’s meaning or color), which is more compatible with semantic processing,
whereas a localization task (as in our experiment) is more compatible with visual processing. According to the strength-of-association account, the feature that is strongly associated with the task interferes with the weakly associated feature more than vice versa. The task in Schwarz and Ischebeck was a traditional two-item numerical comparison task, which may be analogous with an identification task. Thus, the asymmetry may be inverted because their task is more strongly associated with semantic processing, whereas ours is more strongly associated with visual processing. Future experiments could explore whether asymmetrical SCE is attributable to speed of processing or strength of association.

Limitations
A limitation of our experiment is that we revealed just one single piece of evidence supporting late selection. Nevertheless, as noted above, this single piece of evidence provides converging evidence with numerous other recent studies that support the late selection model. Another limitation is that an anomalous data point (RTs for numerically and physically small targets in displays containing five items when participants attended to numerical size) seemed to induce an unexpected four-way interaction and contributed to the main effect of physical size. Although the RT advantage for larger items could be expected when participants attended to physical size, we have no explanation for why there would have been an advantage when participants attended to numerical size.

Conclusions
Because the SCE results from the interaction between a semantic feature (numerical size) and a visual feature (physical size), it is a descendent of the classic word-color Stroop (1935) effect. Indeed, the size congruity effect is often called the numerical Stroop effect (e.g., Dadon & Henik, 2017). In the Stroop literature, word meaning and color are typically presumed to be processed in separate systems (Blais & Besner, 2006). Thus, our findings that support the late interaction model converge not just with other recent SCE studies, but more broadly with the classic word-color Stroop effect.

References


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What Makes You Swipe Right?:
Gender Similarity in Interpersonal Attraction
in a Simulated Online Dating Context

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ABSTRACT. Online dating is quickly becoming one of the most popular ways to select a prospective dating partner. With this in mind, we examined 2 factors influencing interpersonal attraction and deliberate evaluations of a partner, facial attractiveness and ambition, in a simulated online dating context. College-age participants viewed an online dating profile that depicted either a more or a less physically attractive college-age individual of the other sex and described the individual as either more ambitious or less ambitious. Participants then completed a brief likeability questionnaire to measure their interpersonal attraction to the person in the profile. Participants rated the profile higher (more favorably) on the scale of interpersonal attraction when it displayed a more physically attractive person, $F(1, 116) = 23.68, p < .001, \eta^2 = .16$. Participants also rated the profile higher when the autobiography depicted a more ambitious person, $F(1, 116) = 20.92, p < .001, \eta^2 = .16$. None of the interactions were significant. This investigation highlighted gender similarity by demonstrating that both women and men viewed physical attractiveness and ambition as desirable characteristics when selecting a potential dating partner.

Faculties mentor: Stuart Korshavn, PhD

Friendships and romantic relationships, unlike family ties, are chosen and develop over time. They have their start in initial encounters and first impressions. Favorable impressions may lead to interpersonal attraction. Initial attraction may deepen into a long lasting relationship. In the case of romantic relationships, the nature of first encounters is changing. In the past, people often met for the first time face-to-face, whether at work or school, at church or a bar, or through an introduction from a mutual friend. Technology has changed that. Online dating is quickly becoming one of the most popular ways to meet a prospective dating partner (Pew Research Center, 2016).

As the name would suggest, a major difference between online dating and traditional dating is the setting in which it takes place. In the age of online dating, first impressions are no longer face-to-face but instead consist of one or multiple photos and a brief autobiography. A key feature of online dating, which is not present in traditional dating, involves creating a dating profile in which individuals present certain aspects of who they are. Goffman’s (1959), The Presentation of Self in Everyday Life, discussed two different manners in which people present themselves: as performers and as characters. Whitty (2007) investigated how people presented themselves online and judged others’ online self-presentations. She conducted a series of interviews with 30 women and 30 men who had experience with online dating. She found that participants created online dating profiles in the manner of a performer (Goffman, 1959). Participants acknowledged the importance of “selling themselves” (writing their profiles in a way that would appear attractive to others). Participants admitted to misrepresenting themselves with the goal of being perceived as more attractive to others.
(Whitty, 2007). The processes of self-presentation and impression formation may be different in online and traditional dating. The misrepresentation that occurs in the context of online dating can make it difficult to separate fact from fiction.

Another practice in online dating that differs from face-to-face dating is communication. Nonverbal communication is an important part of impression formation and attraction (Givens, 1978). However, nonverbal cues present in face-to-face dating such as tone of voice, gestures, posture, and mannerisms are not present in electronic message exchanges. In online dating, communication is also asynchronous. Because people are not physically together when communicating, there are often delays between messages. Traditional and online dating encompass differing contexts and practices. Thus, it is important to determine if the same variables, which are important in face-to-face dating, have an effect on online dating.

**Factors Influencing Attraction**

It is both natural and healthy for human beings to form romantic relationships with others (Buss, 1989; Diener & Oishi, 2005; House, Landis, & Umberson, 1988). Psychological and evolutionary factors play a role in influencing the selection of a potential dating partner. Psychological factors that influence attraction include similarity, type of relationship, verbal communication patterns, and desirable personality traits such as ambition.

Proximity and physical closeness increase the likelihood of forming relationships (Priest & Sawyer, 1967). People have more frequent encounters with those who are close by. In a classic study examining the effect of proximity on interpersonal attraction, Priest and Sawyer (1967) studied the interactions of students in a dormitory for two semesters. The closer in proximity that students lived to their peers, the more they recognized and liked (were interpersonally attracted to) their peers. Even in the second semester when students recognized peers who lived on the other side of the building, those peers were still liked less than peers who lived closer to the students. The results showed that proximity was a strong predictor of attraction (Priest & Sawyer, 1967).

A phenomenon that often results from proximity is mere exposure. Mere exposure is a phenomenon by which more frequent exposure to and familiarity with a stimulus (e.g., an object, person, song) lead to greater liking of that stimulus (Saegert, Swap, & Zajonc, 1973). Saegert et al. (1973) conducted two studies testing the mere exposure effect and context. Mere exposure was manipulated by varying the number of interactions participants had with each other. Context was manipulated by having participants drink either pleasant or unpleasant tasting beverages. The results showed that attraction increased with the number of interactions, regardless of the context.

Another factor influencing interpersonal attraction is similarity (Montoya & Horton, 2013; Reid & Davis, 2013). Individuals often choose to date those who are similar to them in some way including sharing demographic, physical, personality, and attitude characteristics. A study examining interpersonal attraction and similarity (Reid & Davis, 2013) found that participants were more attracted to partners who, when they first met, held similar attitudes to their own and also to partners who, over time, changed their attitudes to be more like the participants’. Another investigation of interpersonal attraction and similarity (Tidwell & Eastwick, 2012) found that perceived similarity was a stronger predictor of attraction than actual similarity. The researchers found this for specifically perceived similarity (e.g., certain traits and attitudes) as well as general perceived similarity (e.g., how similar individuals felt overall). This may be attributable to people’s tendency to use their schemas to infer additional information about others such as similarity among other traits and attitudes not specifically mentioned.

The type of relationship desired (e.g., short-term vs. long-term or romantic vs. friendship) also influences attraction and selection of a potential dating partner. Regan and Joshi (2003) investigated ideal partner preferences among adolescents, the age when romantic attraction and dating often emerges. Their results indicated that young people have different preferences depending on the length of the relationship. When considering the ideal long-term partner, adolescents emphasized intrinsic qualities such as intelligence and humor. When considering the ideal short-term partner, however, adolescents emphasized externally visible attributes such as physical attractiveness and attributes related to sex drive. The long-term and short-term preferences found in the present study supported previous findings about adult preferences as well (Regan & Joshi, 2003). In another study examining preferences for different relationship types (Sprecher & Regan, 2002), women and men generally preferred several
desirable traits including kindness, expressiveness, and a sense of humor. However, they desired a higher level of these desirable traits in a romantic partner than in a friend. People also preferred a date or romantic partner to have a higher level of physical attractiveness than they preferred a friend to have.

Previous research has suggested that communication patterns play in attraction. Wright, Bates, and Ferguson (2007) examined the effects of stereotypically masculine and feminine communication patterns on attraction. The results indicated that both women and men showed a preference for stereotypically feminine patterns of communication such as offering empathy and support, sharing experiences, and asking questions. Women strongly preferred this open pattern of communication, and men slightly favored this pattern, suggesting gender convergence. Gender differences occurred only in intensity of attraction toward this communication pattern (Wright et al., 2007).

Along with psychological factors, researchers and theorists have considered evolutionary factors that may influence attractions. Evolutionary factors that influence the selection of a potential mate include resource possession, reproductive capability, and physical attractiveness. Women tend to prefer a mate who possesses resources or is likely to acquire resources. These resources can help offspring survive. Thus, women are attracted to men who demonstrate characteristics associated with resource acquisition such as industriousness, earning capacity, and ambition. Across cultures, women value ambition in a mate more than men do (Buss, 1989; Eagly & Wood, 1999). In contrast, men tend to prefer a mate who has reproductive capability. Thus, men are attracted to women who possess characteristics associated with fertility such as youth and physical attractiveness (a sign of health). Crosscultural research (Eagly & Wood, 1999) offered strong support for the prediction that males value physical attractiveness more than women do. Although traits considered as attractive can vary across cultures such as weight and skin color, some characteristics related to physical attractiveness are universal. For example, traits associated with youth and fertility such as smooth skin, full lips, and muscle tone are considered attractive across many cultures (Buss, 1989; Eisenthal, Dror, & Ruppin, 2006). Typically, average faces are seen as more attractive because unusual facial features can be associated with hereditary disease or reproductive problems. There is also some evidence that extreme or exaggerated facial features can be seen as attractive, so long as bilateral symmetry is present (Eisenthal et al., 2006).

Physical attractiveness has been shown to be one of the strongest predictors of interpersonal attraction. Although physical attractiveness tends to be considered more important by men, it is also a strong predictor of attraction for women. Physical attractiveness is such an important factor in dating because the level of physical attractiveness is immediately visible to others. Other characteristics such as a sense of humor and intelligence can take time to discern, whereas good looks are detected instantaneously. First impressions are important when selecting a potential dating partner, and physical attractiveness has a large effect on this initial reaction (Olivola, Eastwick, Finkel, Ariely, & Todorov, 2011).

In a classic summary of early research on interpersonal attraction, Byrne and Griffitt (1973) discussed common determinants of attraction. Much of the experimental work they reviewed demonstrated that physical attractiveness was positively related to interpersonal attraction. When a target photo was presented, both women and men rated more physically attractive photos higher on a scale of interpersonal attraction (Byrne, London, & Reeves, 1968). Byrne and Griffitt (1973) concluded that physical attractiveness was an important factor in selecting short-term dating partners as well as long-term spouses. Although physical attractiveness is a stronger factor for men, both women and men valued attractiveness when selecting a romantic partner (Stroebe, Insko, Thompson, & Layton, 1971). There was also a positive relationship between prestige and interpersonal attraction (Bond, Byrne, & Diamond, 1968) as well as intellectual competence and interpersonal attraction (Griffitt & Jackson, 1970).

**Overview of Present Research**

Li et al. (2013) conducted four studies to examine whether people’s mate preferences (favoring particular traits) predicted actual attraction to and choice of a date in the early stages of dating. Before each study began, participants filled out a questionnaire indicating the importance of social status and physical attractiveness in a potential date (mate preference). In the first two experiments, researchers manipulated social status and physical attractiveness in an online messaging paradigm. In the second two experiments, the same variables were manipulated in a speed-dating paradigm. After
interacting with the potential dates, participants filled out a survey about how attracted they were to the person, and if they would be interested in going on a date with him or her. Li et al. predicted that physical attractiveness would influence men’s romantic interest more than women’s, and that social status would influence women’s romantic interest more than men’s. The results supported both of their hypotheses. In the pre-study survey, men rated physical attractiveness as more important than women did, and women rated social status as more important than men did. Physical attractiveness increased both men’s and women’s evaluations of the potential dates, with whom they interacted in the online messaging and speed dating simulations, but it was considered (marginally) more important by men. Social status increased women’s evaluation of the potential dates, with whom they interacted in the simulations, but not men’s.

In an investigation of actual online dating profiles, Brand, Bynatsos, D’Orazio, and DeShong (2012) were interested in whether the online dating environment would level the playing field by allowing less attractive individuals to showcase their appealing personalities. The researchers hypothesized that the more attractive a person was, the more attractive their personal description would be rated. In order to test their hypothesis, the researchers recruited female participants to rate a number of male dating profiles. Each participant evaluated 25 photos and 25 autobiographies from actual dating profiles. The photos and autobiographies from each profile were separated and rated by different judges. Participants rated the photos and autobiographies on attractiveness. Participants were also asked to evaluate the profiles on how kind, confident, intelligent, and funny they thought the target was, in order to examine if those variables had an influence on how profiles were rated. The investigators assessed the relationship between attractiveness in the photos and in the personal descriptions from the profiles. They found that photo attractiveness and personal description attractiveness were correlated. Those who were rated as more physically attractive also had personal descriptions that were rated as more attractive, even though different judges rated each target’s autobiography and pictures. This finding supported the hypothesis that more attractive men’s autobiographies would also be rated as more attractive. The researchers believed that perceived confidence was a mediating variable. The more aware men were of their attractiveness, the more confident they were of themselves, which in turn influenced their personal descriptions. As a result of this mediating relationship, the investigators concluded that online dating does not provide a context that would level the playing field of dating.

Lee, Dubbs, Von Hippel, Brooks, and Zietseh (2014) created a simulation of online dating. They investigated how multiple variables affected women’s and men’s mate preferences in an online dating context. The investigators hypothesized that facial attractiveness, perceived femininity or masculinity, perceived intelligence, and whether participants were asked to consider the profile in the context of a long-term or short-term relationship, would influence participants’ interpersonal attraction and mate selection. They created simulated online dating profiles to study the effects of these variables. Each stimulus included a facial photo and a brief personal description. The profiles varied on four dimensions: facial attractiveness, perceived femininity or masculinity, perceived intelligence, and short-term versus long-term relationship considerations. The investigators also surveyed participants on a set of demographic variables in order to take the potential effect of those variables into consideration. They found that all of the manipulated variables contributed to the participants’ mate preference and interpersonal attraction to the target in the dating profile. Greater masculinization of men’s profiles and greater feminization of women’s profiles increased the ratings of attraction to the target. Perceived intelligence also increased ratings of attraction to the target. An interaction showed that women who were rated as more attractive received higher interpersonal attraction scores when they had an intelligent statement in their profile, compared to women who were rated as less attractive. This was the sole interaction in the study, but the remaining variables had independent and additive effects.

Sritharan, Heilpern, Wilbur, and Gawronska (2010) conducted an online dating simulation to examine two of the variables that influence impression formation and interpersonal attraction during the online dating process. They hypothesized that facial attractiveness and self-described ambition would influence deliberate evaluations of a potential dating partner in an online dating context. The participants (100 heterosexual female college students) viewed one of four possible online dating profiles, which varied by high or low attractiveness, and high or low ambition. Deliberate evaluations were obtained. Participants completed
Interpersonal Attraction as less attractive, but this effect was significantly labeled with the job title “politician” were rated as more or less pleasant than the average. In 30 trials, the attractive photo was presented before the Chinese ideograph, in 30 trials, the unattractive photo was presented before the Chinese ideograph, and in 30 trials, a gray square was presented before the Chinese ideograph. Self-described ambition was not manipulated in the spontaneous evaluation task. The results indicated a main effect of attractiveness on spontaneous evaluations and a main effect of both attractiveness and ambition on deliberate evaluations. The investigators concluded that both physical attractiveness and ambition have an effect on the selection of a dating partner.

The Present Study
This investigation was partially modeled after the study conducted by Sritharan et al. (2010). This investigation replicated the impression forming task and the deliberate evaluation measure. The current investigation examined the effects of physical attractiveness and ambition on both men’s and women’s evaluations of a potential dating partner, whereas the original study relied on only female participants. Further, the present study offers a different cultural context because it was conducted in the Midwestern United States, and the Sritharan et al. study was conducted in Canada.

We predicted that both facial attractiveness and self-described ambition would have an effect on both women’s and men’s deliberate evaluations of a potential dating partner. We predicted that physical attractiveness would have a larger effect on men’s evaluations than women’s, because of the association between reproductive capability and physical attractiveness (Buss, 1989; Eagly & Wood, 1999). We predicted that ambition would be valued slightly more by women than men because of the association between earning capacity and ambition (Buss, 1989; Eagly & Wood, 1999). Based on traditional sex roles, which hold the man as the breadwinner of the household, male participants may actually be intimidated by ambitious women. A study by Shames, Frankel, and Farjood (2017) investigated women’s political ambition and its influence on attraction. The results indicated that both women and men labeled with the job title “politician” were rated as less attractive, but this effect was significantly larger for women. The researchers concluded that female ambition may be a “turn off” for men, and that women with ambitious job titles may intimidate less ambitious men (Shames et al., 2017). Fisman, Iyengar, Kamenica, and Simonsin (2006) found that men avoid women with high levels of ambition as potential mates, especially when the men believe the women’s ambition exceeds their own.

An alternative explanation to consider is a socioeconomic model, where economic realities are considered. In the United States, single-earner households cannot get along well in today’s economic reality (Pew Research Center, 2015), so men in the United States may set aside traditional gender roles in order to meet their economic needs. For an average-sized family in the United States to be considered a member of the middle class in 2014, it needed to earn at least $48,347 annually. On average, dual-earner households earned $102,400, whereas single earner households only earned $55,000. Therefore, the average single earner household barely met the threshold for the middle class. Although the average single-earner household qualified as middle class, they likely still experienced economic disadvantage. Each partner has wage-earning potential, and in order to support a middle class household and quality standard of living today in the United States, dual-earner households are almost necessary (Pew Research Center, 2015).

Additionally, traditional gender roles of the man as the breadwinner and the woman as the housewife are shifting. In 1970 in the United States, only 40.7% of adult women were in the workforce. In 2009, this increased by more than 19% to 59.7% (Bureau of Labor Statistics, 2011). Therefore, because of the current economic demands and more women in the workforce (a possible indicator of changing gender roles), American men’s reactions to ambitious women may be more positive than they once were. If the socioeconomic model is the better explanation, men would be as interpersonally attracted to ambitious women as women were to ambitious men.

Method
Participants and Design
The procedure of this study was modeled, in part, after the procedure described by Sritharan et al. (2010). Participants were a convenience sample consisting of 116 heterosexual college students, ages 18–22 (65 women and 51 men). Many participants took part in the study in exchange for
Interpersonal Attraction

Participants were recruited from a small, private, four-year, primarily undergraduate, highly residential college located in the upper Midwestern United States. Among the undergraduate student population from which participants were drawn, the average age of the young women was 19.77 years ($SD = 1.21$) and the average age of the young men was 19.70 ($SD = 1.22$). Additionally, 87% identified as European American and 13% identified as students of color. In regards to religion, 41% of undergraduates identified as Roman Catholic, 21% as Protestant, and 38% identified as another religious tradition, no religious tradition, or religious tradition not known. Participants were randomly assigned to one of four experimental conditions in a 2 (ambition) x 2 (physical attractiveness) between-subjects design. Participants viewed a profile including either a more ambitious or less ambitious autobiography and either a more physically attractive or less physically attractive photo. The number of participants in each condition is presented in Table 1.

Measures
Deliberate evaluations of the potential dating partner’s profile were measured with the same 5-item likeability questionnaire used in the study conducted by Sritharan et al. (2010). The survey included the following questions: (a) “How much do you like the person in the profile you have just seen?” (b) “Would you like to go out on a date with this person?” (c) “Would you like to be friends with this person?” (d) “Do you think this person is nice?” and (e) “Would you like to get to know this person better?” Each question was answered on a scale that ranged from 1 (not at all) to 7 (very much). The ratings from each question on the likeability questionnaire were then added together to form a composite score. A higher composite score indicated a more favorable evaluation and increased interpersonal attraction to the target in the profile.

Procedure
Before beginning the study, institutional review board approval (FWA #00015576) was given. At the beginning of each experimental session, participants were greeted and then completed an informed consent form. All participants were made aware that the study was a dating simulation and that their participation would end as soon as they left the experimental session. After informed consent was obtained, the investigator asked participants to take a seat in a small room with a computer that displayed the impression formation task on the screen. Participants were asked to view the dating profile that appeared on the screen and then answer a questionnaire about their opinion of the person in the profile. Participants viewed one of four dating profiles of the other sex target for one minute. After viewing the profile, the task advanced automatically and prompted participants to complete the 5-item likeability questionnaire used in Sritharan et al. (2010). After participants completed the survey, they were debriefed, thanked, and dismissed.

Impression Formation Task
The impression formation task was modeled after the task used by Sritharan et al. (2010). During the impression formation task, participants viewed one of four hypothetical online dating profiles for one minute. The profile displayed a target of the other sex named either Nick or Nicole. The profile was a similar format to that of popular dating apps and websites. The target’s name was displayed on the left side of the profile, with the target’s age (Nick 22; Nicole 20), occupation (student), and distance from the participant (10 miles away) below. A brief autobiography was displayed under this information. The autobiography in every condition began with basic neutral information about the target including height (Nick 6’0”; Nicole 5’6”), physicality (fit), hobbies (spending time with family and friends), favorite food (pizza), zodiac sign (Gemini), and preferences regarding smoking

<table>
<thead>
<tr>
<th>Participant Sex</th>
<th>Target Characteristics</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attractiveness &amp; Ambition</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Women</td>
<td>High</td>
<td>17</td>
<td>20.88</td>
<td>5.19</td>
<td>10–28</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>16</td>
<td>16.75</td>
<td>5.43</td>
<td>9–25</td>
</tr>
<tr>
<td>Men</td>
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<td>12</td>
<td>16.08</td>
<td>3.94</td>
<td>11–20</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>14</td>
<td>15.86</td>
<td>2.98</td>
<td>4–18</td>
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</tbody>
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(never) and drinking (occasionally with friends). The information included in the beginning of the autobiography was based on the neutral information used in Sritharan et al., as well as research on the autobiographies of real profiles on common apps and websites. The rest of the autobiography was manipulated to describe Nick or Nicole either as more ambitious or as less ambitious, depending on the condition. Ambition was manipulated using the same information used in the Sritharan et al. study. In the high ambition condition, the target’s autobiography said that the target was applying to several law schools and working hard to keep up good grades. In the low ambition condition, the target’s autobiography said that at one time the target was going to apply to law school, but decided against it because it was too competitive. The low ambition autobiography also indicated that education was unimportant to the target.

The photograph showing the head and shoulders of the target was displayed to the right of the name and autobiography. The photograph on the profile was chosen to be more or less attractive. In the more facially attractive condition, a photo was featured that had been previously rated as more attractive by a convenience sample of twelve 18–22-year-old heterosexual members of the other sex who did not participate in the study. The judges rated eight photographs of the other sex. The photo of the more facially attractive man received an average rating of 8.1 out of 10, which was the highest rating out of the eight photographs. The photo of the less facially attractive man received a mean rating of 3.9 out of 10, which was the lowest rating out of the eight photographs. The same rating procedure was used for the photos of women. The photo of the more facially attractive woman received a mean rating of 7.0 out of 10, and the photo of the less facially attractive women received a mean rating 3.0 out of 10. The photos that appeared in the profiles were selected because they received markedly different ratings of attractiveness (8.1 vs. 3.9; 7.0 vs. 3.0 respectively). Neither was rated as extraordinarily attractive (e.g., a rating of 10) or unattractive (e.g., a rating of 1).

**Results**

The internal consistency of the interpersonal attraction index was examined using Cronbach’s α. Although the internal consistency among the five items was strong, α = .88, the question “Do you think this person is nice?” had a markedly lower corrected item-total correlation (0.42) than the others. The researchers chose to omit this question from the measure for subsequent analysis, which increased the internal consistency slightly, α = .91. Scores on the revised 4-item likeability questionnaire could range from 0 (a score of 0 on all four questions) to 28 (a score of 7 on all four questions). Means, standard deviations, and ranges of scores on the likeability questionnaire are presented in Table 1.

A 2 (sex of participant) x 2 (ambition) x 2 (physical attractiveness) univariate analysis of variance was conducted to assess the differences in the scores on the likeability questionnaire between women and men among the four dating profile conditions. Participants who viewed the facially attractive target rated the profile higher on the likeability questionnaire than participants who viewed the facially less attractive target, F(1,116) = 23.68, p < .001, η² = .16. Participants who read the ambitious autobiography rated the profile higher on the likeability questionnaire than participants who read the less ambitious autobiography, F(1,116) = 20.92, p < .001, η² = .16. The main effect of participant sex was not significant, nor were any of the interactions between the three variables (all p’s > .49). Facial attractiveness and ambition had independent and additive effects on interpersonal attraction for both women and men. Women and men rated targets higher on the measure of interpersonal attraction who were more physically attractive and who characterized themselves as more ambitious.

**Discussion**

The present study investigated the effect of facial attractiveness and ambition on a deliberate measure of interpersonal attraction in a simulated online dating context. As hypothesized, both women and men rated the simulated profile higher on a measure of interpersonal attraction when the autobiography described the individual as ambitious than when the autobiography described the individual as less ambitious. Women and men also rated the simulated profile higher when the photo displayed a physically attractive individual than when the photo displayed a less physically attractive individual. The effects of ambition and physical attractiveness on interpersonal attraction were independent and comparable. The interactive effect of physical attractiveness and ambition was not statistically significant. The magnitude of their effects on interpersonal attraction was comparable as indicated by their identical effect sizes. However, the prediction that physical attractiveness would have a greater effect on interpersonal attraction
for men while ambition would have a greater effect for women was not supported. The effect of both variables on interpersonal attraction was comparable for women and men.

There are a few different explanations that can account for the results of this study. An evolutionary theory of interpersonal attraction helps explain the main effect of facial attractiveness. Physical attractiveness is an indicator of good health and reproductive capability for both sexes (Buss, 1989; Eagly & Wood, 1999). A socioeconomic model helps explain the main effect for ambition because ambition is an indicator of resource acquisition and financial success (Buss, 1989; Eagly & Wood, 1999). Each partner has wage-earning potential, and dual-earning households are almost necessary today in the United States (Pew Research Center, 2015). Thus, an ambitious partner is desirable for both women and men.

A trait perspective can be used to explain the main effect of ambition. People associate traits with either a positive or negative feeling through a process of classical conditioning. According to research conducted by Anderson (1968), the trait ambition has a positive connotation. A list of personality-trait words was rated for likeability, and ambition was ranked 59 out of 555 on that list. Thus, someone who lacks ambition in one aspect of life such as not applying to law school may lack ambition in other aspects of life such as work or vacationing. Lacking ambition has a negative connotation and can be associated with other negative traits such as being lazy, which was ranked 469 out of 555 using Anderson’s likeability scale. The effect of ambition on attraction can also be explained by specific perceived similarity (Tidwell & Earwick, 2012). All participants in the study were college students. Ambition is related to participation in college and furthering one’s education. Thus, the ambitious autobiography, which included applying to law school as an indicator of ambition, might have also tapped into specific perceived similarity (e.g., participant and target sharing the trait of ambition).

These findings were also consistent with previous research. Sritharan et al. (2010) also found a main effect for ambition and a main effect for physical attractiveness. Lee et al. (2014) found that multiple variables including facial attractiveness had an effect on interpersonal attraction. Byrne and Griffitt (1973), summarizing earlier research, reported that, in studies where a target photo was displayed, participants rated more physically attractive photos higher on an interpersonal attraction scale.

Although much of the interpersonal attraction and mate selection literature has highlighted gender differences (Buunk, Dijkstra, Fetchenhauer, & Kenrick, 2002; Evans & Brase, 2007; Mardhekar & Aradhya, 2010; Townsend & Wasserman, 1998; Wiederman, 1993), the present study offered support for gender congruence. Women and men may actually value many of the same characteristics when selecting a potential mate. Wright et al. (2007) found that women and men both preferred their partners to have a stereotypically feminine communication pattern. Cramer, Schaeffer, and Reid (1996) also found evidence for gender similarity in mate selection. The results indicated that possessing traits associated with reproductive success (women who are attractive and sexually responsive; men who are college-educated with a good earning capacity) leads to gender convergence in mate preferences. They used sexual strategies theory as an explanation for this convergence. Sexual strategies theory asserts that women and men must solve both common and gender-specific problems for short-term as well as long-term mates. Thus, both women and men prefer mates who possess traits that offer a solution to a common mating problem, reproductive success (Cramer et al., 1996).

There were several limitations to this investigation. The study was only a simulation and participants were aware of this. Participants did not arrange a date with any of the targets. This hindered the experimental realism of the study. Participant characteristics such as additional demographic, attitudinal, and behavioral data were not collected. It cannot be determined if any participant characteristic was associated with a preference for a more ambitious or attractive potential dating partner. This study only tested college-age individuals in one region of the United States, which limited the ability to draw conclusions about individuals in other age groups and regions. A self-report measure was used to measure interpersonal attraction, which hindered validity. The self-report measure of preferences may not be correlated with the actual behavior of the participants. Participants’ implicit evaluations were not measured. The stimuli could be seen as a limitation because only two different photos and two different autobiographies were presented. Including multiple high and low attractiveness photos and a variety of different ambition-related autobiographies could increase generalizability.
because participants would respond to a variety of indicators of attractiveness and ambition.

The findings from this investigation suggest possibilities for future research. It would be advantageous to conduct a field study to increase external validity. Researchers could post profiles on actual dating websites or applications and observe a variety of behaviors such as swiping right, sending a message, or trying to stage a meeting. A field study would be able to study not just preference, but actual behavior that takes initiative and might lead to an encounter. If a trait perspective is the best explanation, other characteristics, aside from ambition and the traits connected with the attractiveness stereotype, could be studied to see if women and men value them equally and to see if they influence interpersonal attraction. For example, there is research to support humor’s influence on attraction in traditional dating (Murstein & Brust, 1985; Sprecher & Regan, 2002). Researchers could investigate whether humor is typically used in online dating profiles as a strategy to attract a mate. They could also examine whether humor conveyed in online dating profiles effectively influences interpersonal attraction, and if the effect is similar for both women and men.

There are practical and theoretical implications of the study’s findings. The findings add to the understanding of how potential dating partners are selected in an online context. The results provide an optimistic view for individuals who are not both physically attractive and ambitious. Having both qualities is better, but not necessarily imperative to spark interpersonal attraction. Profiles that displayed the target as physically attractive but less ambitious or ambitious but less physically attractive still received moderately favorable scores of interpersonal attraction on the likability questionnaire. These findings also demonstrate that women and men place similar value on ambition and physical attractiveness when evaluating a potential partner, whereas a lot of current research highlights gender differences (Buunk et al., 2002; Evans & Brase, 2007; Mardhekar & Aradhya, 2010; Townsend & Wasserman, 1998; Wiederman, 1993). The present research highlights gender similarities. This differs from what popular stereotypes suggest. This research shows that women and men value the same traits (ambition and physical attractiveness) when selecting a potential dating partner.

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