# The Impact of Ethical Orientation and Personality on Virtual Collaboration Usage

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*This paper predicts the use of virtual collaboration using instant messaging applications in a university setting. It examines the impact of age, sex, ethical orientations, and bright and dark personality traits on the usage of virtual collaboration applications. A significant finding is younger students and women are more likely to use this type of application. While ethical relativity and egoism also predict usage, being oriented toward justice negatively relates to application utilization. In terms of personality, the bright measure of extroversion is highly significant as is the dark variable narcissism. Finally, there is a very strong negative relationship with psychopathy.*

*Keywords: instant messaging, ethics, personality, Dark Triad*

## INTRODUCTION

The use of digital technologies such as instant messaging applications and videoconferencing is increasingly being used by university students. Among the benefits cited by students include improving communication, saving time through immediate feedback, resolving administrative issues, and convenience giving their near-universal possession of smart phones (Lauricella & Kay, 2013). The COVID-19 pandemic greatly accelerated it use to help people stay connected during shelter-in-place mandates. However, this trend has also accompanied by growing concerns over digital ethics in classrooms (Veliz, 2021). Indeed, the pandemic era was marked by a substantial increase in reports of college students engaging in academic dishonesty (Dey, 2021). Cheating behavior – on exams, quizzes, homework, and projects and papers - was higher in online classes compared to in-person classes (Jenkins et al., 2023). There are countless ways that students can cheat, including, but not limited to, using AI platforms such as ChatGPT and Gemini to generate answers to essay exams (Westfall, 2023), to look up homework answers on Chegg (Adams, 2021),

and to share unauthorized information on group messaging applications. While such applications could be used by students to post reminders of upcoming assignment due dates or meeting times for study groups, they are increasingly being used for unethical reasons like unauthorized collaborating on online exams that are supposed to be completed individually (McGee, 2020).

Scant previous research has focused on studying the influence of key demographic variables, ethical orientations, and bright and dark personality traits on usage of virtual collaborative applications. This paper focuses on predicting the use of such collaborative applications as they have gained in popularity among college students (Jones, 2020), have ethical implications, and show signs of increased usage.

## LITERATURE REVIEW AND HYPOTHESES

Significant work has been conducted examining the myriad of challenges and obstacles that need be overcome for effective virtual collaboration. Recently Morrison-Smith and Ruiz (2020) published a comprehensive review of more than 250 relevant studies. The bulk of these studies focused on external factors, such as physical and temporal distances, the nature of the work being completed, and team leadership. However, little attention has been paid to personality difference among participants. That is, who is more likely to voluntarily engage in virtual collaboration?

Four overarching variables are hypothesized to have an impact on the usage of virtual digital collaboration in a classroom setting. Specifically, these are 1) demographic characteristics, 2) ethical orientations, 3) bright, other-focused, supportive personality traits, and 4) dark, self-serving personality traits. Within each broad category, we provide a series of specific supporting subhypotheses.

### Demographic Characteristics

Certain demographic characteristics, like sex and age, have received scant research attention in relation to whether and to what extent they predict virtual collaboration among college students. One recent study (Yang, et al., 2024) found that women generally have more positive experiences than men with virtual collaborations. However, demographic variables have been shown to impact a myriad of organization outcomes (see, for example, Peterson, Rhoads, & Vaught, 2001), so it is likely there will also be a relationship with virtual collaboration usage. Thus, we propose the following broad demographic hypothesis, followed by two specific subhypotheses exploring age and sex:

***H1:*** *Demographic characteristics will predict the use of virtual collaboration in a classroom setting.*

*Age*

Gen Z, or those individuals born between 1997-2012 (Dimock, 2019), have been described as having grown up in a digital world, caring for others (Fox, 2021), and being highly collaborative (De Witte, 2022). These three characteristics could help explain why this generational cohort might be inclined to use virtual collaboration applications to help one another to complete college homework assignments, quizzes, or exams. The motivations behind this behavior can be viewed through different lenses. From one research vantage, such actions can be considered positive prosocial behavior. Positive prosocial behavior represents a broad category of acts, such as helping, sharing, comforting, donating, or volunteering, and cooperation, that are intended to benefit others (Dovidio & Banfield, 2015).

On the other hand, there motivations can also be what scholars label *unethical* prosocial behavior, which is designed to help others, but is in violation of accepted social values, standards of conduct, laws or ethical norms (Mo, et al., 2023). Individuals who hold strong reciprocity beliefs were more likely to engage in "unethical prosocial behavior with an anticipation of a future reward" (Umphress, 2010: 769). Thus, students may engage in unethical information sharing to help themselves by helping others, a quid-pro quo in which the group uses the technology to help others so that they, too, can benefit. Therefore, we propose the following hypothesis:

***H1a:*** *Younger people will be more likely than older people to use virtual collaboration applications in a classroom setting.*

*Sex*

Although sex is often incorrectly thought to have the same meaning as gender, the terms describe different but connected constructs. Sex refers to biological attributes that distinguish males, females, and intersex individuals. Gender, on the other hand, encompasses a person's internal sense of being male, female, or something else entirely. It also includes how a person expresses their gender through clothing, behavior, and social interactions (National Institutes of Health, 2024). However, in keeping with current usage, our hypotheses will use the terms women and men as opposed to the awkward phrasing of female and male.

Early studies in sex-based online communication differences find that women are more likely to carry on longer and more complex talkative discussions compared to the more abbreviated just the facts interactions of men (Baron, 2004). Women have also been shown to be more likely to collaborate with others than men (Novotney, 2023). Additionally, researchers found that women in a collaborative workplace were significantly more interactive than men (Onnela et al., 2014). A study of collaborative differences between men and women found that women are more likely to agree with the statement "Being a good team player means helping all of my colleagues with what they need to get done," whereas men are more likely to agree with the statement "Being a good team player is knowing your position and playing it well" (Heim & Murphy, 2003). In organizations that get work done through informal project teams or that have overlapping accountabilities, this difference in perspective has implications for the way men and women engage in collaboration, including when virtual. Recently, a series of longitudinal studies on group chat usage show that between 2017 and 2021, women's usage increased by 53% whereas men's usage rose by 44% indicating that women may find group messaging more useful than men (Statistica, 2024a; 2024b). Thus, we propose:

***H1b:*** *Women will be more likely than men to use virtual collaboration applications.*

**Ethical Orientations**

Ethical orientations can be thought of as one's general outlook concerning what is right or wrong, and what is acceptable versus unacceptable behavior guiding one's actions. Philosophers and ethicists have identified many different ethical orientations. While each approach has its relative merits and drawbacks, people use their preferred ethical orientation when deciding upon actions and a host of research has demonstrated a clear link between ethical orientation and decision-making (Mudrack, 2007).

Therefore, we propose the following broad hypothesis, followed by three supporting subhypotheses exploring justice, relativism, and egoism:

***H2:*** *Ethical orientations will predict the use of virtual collaboration applications over-and-above demographic variables.*

*Justice*

Justice, as an ethical orientation, prioritizes fairness and impartiality. It emphasizes both the equal treatment of people in terms of opportunity and a focus on individuals receiving what they deserve based on contributions. This does not mean that everyone receives the same outcome regardless of their contribution. While there are many forms of a justice-based outlooks (such as procedural justice, distributive justice, and informational justice), all are based on the idea of fairness and impartiality. According to this approach, a just action is one that follows established procedures, ensuring that everyone is treated equitably, regardless of their background. Actions taken outside the prescribed boundaries are considered unethical. Therefore, we propose:

***H2a:*** *Those with higher justice orientations will be less likely to use virtual collaboration applications over-and-above demographic variables.*

*Relativism*

Relativism refers to the extent that individuals reject universal ethical rules when making moral decisions (Henle, Giacalone, & Jurkiewicz, 2015). According to McDonald (2009), adherents to relativism believe there is "no consistency of moral beliefs because moral principles are relative to individual persons and, consequently, there are no absolute or universal moral standards" (p. 448). Because ethical rules are relative to a specific situation, the beliefs of one situation or culture may not apply to another; the values of one group does not need to apply to another. This argument is often used against allegations of unethical behaviors of company personnel when operating internationally. People who hold to this approach to ethics would, therefore, be more likely to engage in actions that are beneficial from their perspective. Thus, we propose:

***H2b:*** *Those with higher relativist ethical orientations will be more likely to use virtual collaboration applications over and above demographic variables.*

*Egoism*

Egoism is a teleological approach to ethics that focuses on the individual (Reidenbach & Robin, 1990). While there are many variations of egoism, this ethical approach generally posits that an act is ethical when it promotes the individual's interests. Our free-market economic system, as exemplified by the works of Adam Smith (1776/1976), is based upon the notion that individuals act in their own self-interest. Popularized by the works of the author Ayn Rand, an egoist will prioritize their own well-being over helping others, even if doing so harms other people. As such, an ethical egoist will tend to engage in behaviors if doing so furthers their own self-interests. As an individual is more oriented towards egoist ethical philosophies, they are going to exhibit more self-interested behaviors (O'Neill, 1993). Given the premise that using virtual collaboration is likely to help the person gain additional knowledge or insights (or a higher grade), we hypothesize:

***H2c:*** *Those with higher egoist orientation will be more likely to use virtual collaboration applications over and above demographic variables.*

**Bright Personality**

Perhaps the single most widely validated taxonomy of personality traits are the Big Five traits of conscientiousness, agreeableness, neuroticism, openness-to-experience, and extraversion (John & Srivastava, 1999). These five broad traits provide a fundamental framework to understand individual differences in personality (John & Srivastava, 1999). Although there are five factors comprising this grouping of generally positive assessments of individual personality characteristics, this study examines the two variables that are outwardly socially focused; that is, those that involve interacting with, and being helpful towards, other people. Researchers frequently refer to positive, beneficial traits as bright traits (cf, Hanson, Valentine & Shultz, 2024). Specifically, these are extraversion and agreeableness. Individuals high in extraversion need external stimulation and focus on others manifested as sociability and talkativeness. Agreeableness centers around altruism, interactions, and being helpful. Given their facilitation of interpersonal relationships, extraversion and agreeableness are viewed as precursors to community membership and group acceptance (Lounsbury et al., 2003). As such, these bright supportive personality variables are likely to influence one's propensity to engage in virtual collaboration. Thus, we propose the following broad hypothesis, followed by two sub hypotheses examining extroversion and agreeableness:

***H3:*** *Bright personality traits will predict the use of virtual collaboration applications over-and-above demographic variables and ethical orientations.*

*Extroversion*

Extroversion is a personality trait characterized by outgoingness and talkativeness. Typically, an extrovert is someone who recharges and becomes more energized by engaging with other people. Individuals who are extroverted tend to seek out social interactions. This trait has been routinely shown to predict job performance across a myrid of situations and cultures involving social interaction (Tuffour & Ockrah-Anyim, 2020; Wilmot et al., 2019), an important part of being a successful business student. Due to the social focus and sharing nature of collaboration applications, it will have a strong appeal to extroverts. Thus, we propose:

***H3a:*** *Those with higher extraversion will be more likely to use virtual collaboration applications over-and-above demographic variables and ethical orientations.*

*Agreeableness*

Agreeableness is a personality trait best described as being cooperative, kind, and friendly. People high in agreeableness are more trusting, altruistic, and typically display more positive prosocial behaviors than those who are less agreeable. People high in agreeableness often show a great deal of concern for the welfare of others. Due to the focus on being helpful and cooperative, aiding others through virtual collaboration will likely have a strong appeal to those with an agreeable personality. Thus, we propose:

***H3b:*** *Those with higher agreeableness will be more likely to use virtual collaboration applications over-and-above demographic variables and ethical orientations.*

***Dark Personality***

Dark personality has been investigated for decades, particularly in organizational sciences and psychology. Dark personality traits are socially undesirable characteristics associated with self-serving actions that harm others (Van Scotter & Roglio, 2020). Individuals with dark traits are more likely to use others instrumentally to achieve personal gains, have a lack of empathy and understanding for others, and engage in interpersonal manipulation of their environment (Bonfá-Araujo et al., 2022). A well-validated taxonomy of dark personality traits is the Dark Triad which includes the undesirable traits of Machiavellianism, narcissism, and psychopathy. The traits associated with the Dark Triad are self-interest, focusing on individual gain, and seeing others as merely tools to be used for one's advantage. We suspect that people who are high in dark personality traits may see virtual collaboration as a means to manipulate others in order to further their own goals. Thus, we propose the following overarching hypothesis and three supporting sub hypotheses exploring Machiavekkianism, narcissism, and psychopathy:

***H4:*** *Dark personality variables will predict the use of virtual collaboration applications over-and-above demographic variables, ethical orientations, and bright personality variables.*

*Machiavellianism*

Machiavellianism is characterized by amorality, deceit, and opportunism in the belief that the ends justify the means (Christie & Geis, 1970). We predict that those scoring high in Machiavellianism will be more likely use virtual collaboration applications in an unethical prosocial manner to engage in knowledge sabotage (Serenko & Choo, 2020) in hopes of gaining a relative advantage over their fellow students. That is, they may intentionally mislead fellow students through erroneous questions, deliberately provide incorrect information, or undermine the veracity of information provided by others. Thus, we propose:

***H4a:*** *Those with higher Machiavellianism will be more likely to use virtual collaboration applications over-and-above demographic variables, ethical orientations, and bright personality variables.*

*Narcissism*

Narcissism entails a sense that one is truly special and deserving of the admiration and adoration of others, regardless of an objective assessment of one's skills and abilities (Raskin & Hall, 1979). Narcissists have a sense of superiority and arrogance, coupled with entitlement, and self-admiration (Emmons, 1984). Therefore, it is highly probably that such individuals are going to be drawn to virtual collaboration as a way of promoting their own "clearly superior" ideas or potentially explaining to others how things work, especially when such behaviors benefit them (Harrison et al., 2018). Thus, we propose:

***H4b:*** *Those with higher narcissism will be more likely to use virtual collaboration applications over-and-above demographic variables, ethical orientations, and bright personality variables.*

*Psychopathy*

Psychopathy is characterized by "high impulsivity and thrill-seeking along with low empathy and anxiety" (Paulhus & Williams, 2002). High levels of psychopathy indicate a complete lack of remorse for one's bad behaviors and ill-gotten gains. Psychopathy is not as well understood because of the far fewer studies done on successful and non-criminal psychopaths (Mahmut et al., 2007). What we do know is that more broadly, psychopaths are skilled at manipulating others if motivated to do so (Paulhus, 2014), as well as taking credit for others' work and accomplishments (e.g., Hare, 1999). Psychopaths make far riskier decisions than other people (Carré et al., 2023), are more concerned with their own personal success as compared to relationships (Salekin et al., 2001), and have little problem accepting and rationalizing their antisocial behavior (Harrison et al., 2018). Given their lack of care about the thoughts of others, we suspect people with higher levels of psychopathy would be less likely to ask other for assistance and guidance. Thus, we propose:

***H4c:*** *Those with higher psychopathy will be less likely to use virtual collaboration applications over-and-above demographic variables, ethical orientations, and supportive personality variables.*

## METHOD

### Sample and Procedures

To test the hypotheses, 350 undergraduate students from a large public university located in the southwestern United States were recruited for participation in the study. All subjects were junior and senior-level students enrolled in upper division management classes taught by three of the authors. All data were gathered using questionnaires administered during the semester. Participation was voluntary and students who elected not to complete the survey were given an equally valued alternative exercise. Approval to conduct the survey was obtained from the university's Institutional Review Board, and participants were assured their responses would be kept confidential. Surveys with missing or erroneous answers were eliminated from the analysis. Overall, 276 usable surveys were obtained from the students, for an overall response rate of 79 percent. The average age of the respondents was 21.8 years old, 53 percent were males. An analysis of the survey data revealed no significant differences in the survey results between the professors' courses so all data were compiled into a single dataset.

### Dependent Measure

Respondents were asked to provide information about the frequency of their use of virtual collaboration applications for assistance in their studies. Specifically, they were asked the question "How often do you use GroupMe or some similar group messaging app for help in your classes?" This was scored on a five-point Likert-type scale, with the anchors ranging from Never = 1 to All the time = 5. Although there is a bias against single-item measures in behavioral research, as pointed out by Allen, Iliescu, and Greiff (2022), many studies have established their validity and reliability. This is especially true when the question is narrow in scope, such as the one asked in this study (Wanous, 1997). As an assessment of face validity

(Holden, 2010), there is no reason to believe that this measure does not adequately capture a person's perceived frequency of use of group messaging applications in the course of their coursework.

**Independent Measures**

*Sex*

Subjects were asked to identify their biological sex, with female = 0, male = 1, or other = 2.

*Age*

Respondents were asked to give their age in years.

*Socially Desirable Responses (SDR)*

Social desirability can be considered a style of responding that contaminates and distorts measures of psychological variables (Nicholson & Hogan, 1990). Therefore, SDR should be controlled in any study that includes psychological variables (Crant, 1995). SDR was assessed using Reynold's (1982) 13-item social desirability scale, with a reported reliability of .76. Sample items include "No matter who I'm talking to, I'm always a good listener" and "I have never deliberately said something to hurt someone's feelings." Respondents provide true or false answers to each of the questions.

*Ethical Orientations*

Justice, relativism, and egoism were assessed using the Multidimensional Ethical Scale originally developed by Reidenbach and Robin (1988). Subjects read two different business scenarios describing a situation and an employee's response to the situation. The respondents are asked to rate their feeling about the actions using 28 seven-point Likert scale questions, each with different anchors based on the ethical orientation being assessed. The items, which comprise subscales for each of the ethical orientations are averaged, with higher scores indicating a stronger orientation towards the ethical orientation. Anchors for justice include unjust versus just and unfair versus fair, with a reliability of .73. Anchors for relativism include "not acceptable to my family" versus "acceptable to my family" and "culturally unacceptable" versus "culturally acceptable," with a reliability of .74. Anchors for egoism include "not self-promoting for me" versus "self-promoting for me" and "not personally satisfying for me" versus "personally satisfying for me," with a reliability of .74.

*Bright Personality Variables*

The bright personality variables of extraversion and agreeableness were gathered using the Big Five Inventory-2 Extra Short Form (Soto & John, 2017). It was comprised of 15 five-point Likert scale questions ranging from Strongly Disagree=1 to Strongly Agree=5. The items comprise subscales for each of the bright personality measures. The items in each subscale are averaged, with some of the items being reverse-coded. Higher scores indicate stronger orientations towards the personality trait. Sample questions for the extroversion subscale include "I am someone who tends to be quiet" and "I am someone who is full of energy." Sample questions for the agreeableness subscale include "I am someone who is sometimes rude to others" (reverse scored) and I am someone who assumes the best about people."

*Dark Personality Variables*

The dark personality variables of Machiavellianism, narcissism, and psychopathy were gathered using the Dirty Dozen assessment instrument (Jonason & Webster, 2010). It was comprised of 12 five-point Likert scale questions ranging from "strongly disagree" to "strongly agree." The items comprise subscales for each of the three dark personality measures. The items in each subscale are averaged, with higher scores indicating stronger orientations towards the maladaptive personality trait. Sample questions for the Machiavellianism subscale include "I tend to manipulate others to get my way" and "I have used flattery to get my way," with a reliability of .74. Sample questions for the narcissism subscale include "I tend to want others to admire me" and "I tend to seek prestige or status," with a reliability of .74. Sample questions for

the psychopathy subscale include "I tend to be cynical" and "I tend to be callous or insensitive," with a reliability of .76.

## RESULTS

### Descriptive Statistics

Table 1 presents means, standard deviations, and correlation coefficients for the variables in the study. Multiple measures of different elements of the same phenomenon are important for improved construct validity; however, they are frequently intercorrelated with one another (Pedhazur & Schmelkin, 1991). However, an examination of the correlation matrix indicates that all of the correlation coefficients are considerably less than 0.8 in absolute value, a frequently cited and commonly used threshold for the detection of multicollinearity (Kennedy, 2008).

### Hierarchical Regression Models

To first assess the impact of the independent variables on virtual collaboration, hierarchical regression analysis was employed. This technique is consistent with the methodology applied in other explorations of the impact of ethical orientations and personality variables on individual behaviors (cf., Kirby & Kirby, 2015). The demographic variables were first entered into the initial equation. Because prior research showed a relationship between ethical orientations and individual behaviors (Kirby & Kirby, 2015), we next wanted to see if ethical orientations had any additional impact. Therefore, the three ethical orientations were entered in the second block. Next, the impact of personality on virtual collaboration was assessed over-and-above the impact of demographics and ethical orientation, Therefore, the bright, helper personality variables of extraversion and agreeableness were added in the third block and the dark traits of Machiavellianism, narcissism, and psychopathy were added in the final block.

An important issue in hierarchical regression analysis is that of practical significance. Although a measure can be statistically significant, questions can be raised over whether it is practically significant. Does the measure improve decision making and task prediction enough to justify its inclusion? Yates and Taub (2003) argue that, in behavioral research, if a measure is relatively easy and cost-free to administer, it can be said to have practical significance if it aids in the prediction of the outcome under study.

While there are multiple ways of determining practical significance, a widely accepted method is through an assessment of incremental validity (Hunsley & Meyer, 2003). Incremental validity is defined as "the extent to which a measure adds to the prediction of a criterion beyond what can be predicted with other data" (Hunsley & Meyer, 2003, p. 443). Incremental validity can be assessed by calculating a measure's semi-partial *r* when using hierarchical regression analysis (Cohen, 1992). The semi-partial *r* is computed as the square root of the $R^2 \Delta$ value for the regression equation (Hunsley & Meyer, 2003). Most relationships fall within $r = .10$ to .30 in behavioral research (Hunsley & Meyer, 2003). Cohen (1992) identifies this as the small to medium range. As variables are added to an equation, *r* increments generally decrease because variables in behavioral research are frequently interrelated (Nunnally & Bernstein, 1994). Hunley and Meyer (2003) propose when a third (or more) variable is included in a regression analysis, a semi-partial *r* of .15 or greater is a reasonable contribution to the equation, thus indicating practical significance.

The results of the hierarchical regression equations testing Hypotheses 1, 2, 3, and 4 are shown in Table 2. All four steps in the model are significant, and the $F \Delta$ value in each model is also significant, signifying that each block of variables significantly improves the explanatory power over the preceding model. Also, the semi-partial *r* values for all blocks exceed Hunley and Meyer's .15 threshold, thereby indicating the models have practical significance.

**TABLE 1**
**DESCRIPTIVE STATISTICS AND CORRELATION**

| *Variable* | *Mean* | *s.d.* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* | *11* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Virtual Collab. | 3.19 | 1.24 | | | | | | | | | | | |
| 2. Age | 21.76 | 3.26 | -.14** | | | | | | | | | | |
| 3. Sex | .53 | .51 | -.15** | .19** | | | | | | | | | |
| 4. SDR | 7.31 | 1.82 | -.08 | -.06 | -.01 | | | | | | | | |
| 5. Justice | 2.84 | 1.11 | -.04 | -.05 | .15** | .02 | | | | | | | |
| 6. Relativism | 3.03 | 1.03 | .08 | -.00 | .02 | .10* | .66** | | | | | | |
| 7. Egoism | 2.48 | 1.13 | .10* | .06 | .10* | .05 | .55** | .53** | | | | | |
| 8. Extraversion | 3.21 | .83 | .20** | .03 | .06 | -.07 | .07 | .04 | .21** | | | | |
| 9. Agreeableness | 3.59 | .78 | .09 | -.15** | -.21** | -.06 | -.07 | -.10* | -.05 | .09 | | | |
| 10. Mach. | 2.48 | .91 | .09 | -.07 | .20** | .15** | .06 | .08 | .13* | .15** | -.27** | | |
| 11. Psychopathy | 1.91 | .82 | -.18** | .09 | .29** | .01 | .22** | .23** | .26** | .00 | -.47** | .35** | |
| 12. Narcissism | 2.87 | .90 | .25** | -.14** | .06 | .01 | -.03 | .02 | .09 | .34** | -.01 | .39** | .10 |

* significant at $p < .05$; ** significant at $p < .01$

**TABLE 2**
**RESULTS OF HIERARCHICAL REGRESSION ANALYSIS ON VIRTUAL COLLABORATION**

| | *Step 1 (Demographic)* | | | *Step 2 (Ethical)* | | | *Step 3 (Bright)* | | | *Step 4 (Dark)* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | B | s.e. | β | B | s.e. | β | B | s.e. | β | B | s.e. | β |
| Constant | 4.82 | .60 | | 4.80 | .63 | | 3.72 | .80 | | 3.80 | .87 | |
| Age | -.05 | .02 | -.12* | -.60 | .02 | -.15* | -.06 | .02 | -.15* | -.04 | .02 | -.11 |
| Sex | -.30 | .15 | -.12* | -.25 | .15 | -.10 | -.25 | .15 | -.10 | -.21 | .15 | -.09 |
| SDR | -.06 | .04 | -.09 | -.07 | .04 | -.11 | -.06 | .04 | -.09 | -.08 | .04 | -.11* |
| Justice | | | | -.26 | .10 | -.23** | -.25 | .09 | -.22** | -.21 | .09 | -.18* |
| Relativism | | | | .19 | .10 | .16* | .21 | .10 | .17* | .22 | .10 | .18* |
| Egoism | | | | .18 | .08 | .16* | .13 | .08 | .12 | .15 | .08 | .13 |
| Extraversion | | | | | | | .27 | .09 | .18** | .16 | .09 | .11 |
| Agreeable | | | | | | | .04 | .10 | .03 | -.07 | .11 | -.04 |
| Machiavellian | | | | | | | | | | .12 | .09 | .08 |
| Psychopathy | | | | | | | | | | -.37 | .11 | -.24** |
| Narcissism | | | | | | | | | | .23 | .09 | .17* |
| F-score | 4.02** | | | 4.09** | | | 4.37** | | | 5.31** | | |
| Δ F-score | 4.02** | | | 4.02** | | | 4.88** | | | 7.04** | | |
| $R^2$ | .04 | | | .08 | | | .12 | | | .08 | | |
| Δ $R^2$ | .04 | | | .04 | | | .03 | | | .07 | | |
| Adjusted $R^2$ | .03 | | | .06 | | | .09 | | | .15 | | |
| Semi-partial r | .20 | | | .20 | | | .18 | | | .25 | | |

*p < .05; **p < .01

As shown in Table 2, all four main hypotheses are supported. More specifically, the supporting hypotheses 1a and 1b are also supported. Women are statistically more likely than men to use virtual collaboration and younger adults are more likely than older ones to use it.

All three of the ethical orientations supporting hypotheses (2a, 2b, and 2c) were supported. In particular, the justice ethical orientation is significantly negatively related to virtual collaboration applications usage, whereas relativist and egoist orientations are significantly positively related to virtual digital collaboration.

Of the two sub-hypotheses related to bright personality traits, only one was supported. Hypothesis 3a, which predicted a positive relationship between extroversion and virtual collaboration, was supported. However, the second supporting hypothesis (Hypothesis 3b) regarding the relationship of agreeableness to the usage of virtual collaboration applications had no statistically significant relationship.

Finally, although there is statistical support for the main hypothesis regarding the influence of dark personality traits on virtual collaboration, only two of the three supporting hypotheses were supported. Specifically, narcissism is significantly related to the use of virtual collaboration (thus supporting hypothesis 4b) while psychopathy is highly negatively related to group message usage, thus supporting Hypothesis 4c. However, hypotheses 4a showed no statistical relationship and was not supported.

## DISCUSSION

This research explored the impact of two demographic variables, age and sex, on the usage of popular virtual collaboration applications. We discovered that younger people and women are more likely to use this type of application. This is important as the percentage of women in college is increasing and the average age of students is falling. In 2011, men made up 47% of students enrolled in four-year institutions. In 2023, that figure was down to 42% (Fry, 2023). Nationwide, there has also been a rapid growth in dual-enrollment (DE) programs, through which students earn college credit while still in high school. As a result, the age at which students reach junior and senior class status is decreasing. For example, in the state of Indiana, 39 percent of high school students graduated with college credit in 2012. That number had increased to 60 percent by 2018 (U.S. Department of Education, 2022).

While ethical relativity and egoism also predict collaborative application usage, being oriented toward justice negatively relates to its utilization. Unsurprisingly, ethical egoists and relativists are more likely to engage in virtual collaboration. Egoists are much more likely to believe their views are more important than those of others and, therefore, they will broadcast them to their peers. Additionally, in our increasingly pluralistic society that recognizes and values individual expression over group conformity, the relativist ethical orientation appears to be on the rise. *"What is right for you doesn't necessarily apply to me"* so it is likely that we will see the usage of virtual collaboration also rise.

The bright measure of extroversion is highly significant. The positive relationship between extroversion and virtual collaboration was supported and will be useful in designing virtual classroom settings that increasingly encourage engagement to reduce the student isolation common in online environments. What is somewhat surprising is that there was no significant relationship between agreeableness and virtual collaboration. We suspect this may be due to the well-deserved reputation of virtual interactions turning vitriolic due to the relative anonymity of online collaboration. This environment would likely not appeal to people valuing agreeableness.

Regarding the influence of dark personality traits on virtual collaboration, two of the three supporting subhypotheses were supported. Specifically, as hypothesized there is a very strong negative relationship with psychopathy. Additionally, narcissism is significantly related to the use of virtual collaboration. The third hypothesis regarding the anticipated positive relationship between virtual collaboration and Machiavellianism was not supported. We predicted that those scoring high in Machiavellianism would use it in an unethical prosocial manner to engage in knowledge sabotage (Serenko & Choo, 2020) in hopes of gaining a relative advantage over their fellow students. While there is a positive relationship in this direction, it is not statistically significant. We suspect this may be due to the non-competitive classroom environment. Theoretically, every student could earn an A since they are not competing with one another

for a limited resource. In a competitive situation, such as a workplace with limited promotion opportunities or bonus pools, this relationship may gain in strength to the point of being statistically significant.

**Limitations and Future Directions**

Our study used a cross-sectional sample at a single moment in time, thus we are unable to make causal inferences. Future research could replicate our findings using longitudinal studies to establish causality. Additionally, it is unknown whether the ethical climate of the college or university also interacted with ethical orientation. Future studies will need to expand the student population sample to include data across colleges, courses, and instructors. While the current study provides considerable insight into the role that ethical orientations play in virtual collaborations, it covers only some measures. Among the measures that could be considered are measures of ethical orientation that are well-established in the literature, including moral identity, integrity, moral approbation, and moral attentiveness. As this study did not seek to explore why students use virtual collaboration applications, future research could explore the motivations behind the usage of such applications. Finally, although statistically and methodologically valid (Allen et al., 2022), there may be concerns about the use of a single-item measure of virtual collaboration usage. Future studies could assess this using multiple questionnaire items and, perhaps, a self estimate of the number of hours spent per week spend engaging in class-related virtual collaboration.

## CONCLUSION

This paper explored the use of virtual collaboration among college students using virtual collaboration applications in a university setting. We examined the impact of age, sex, ethical orientation, and bright and dark personality traits on the usage of popular virtual collaboration applications, such as GroupMe. A significant finding of the study is that younger students and women are more likely to use this type of application. While ethical relativity and egoism also predict usage, being oriented toward justice negatively relates to application utilization. In terms of personality, the bright measure of extroversion is highly significant as is the dark variable narcissism. Finally, there is a very strong negative relationship with psychopathy.

Given the explosive rise in artificial intelligence applications, the opportunities for students to gain assistance with their studies (whether authorized or not) will expand at an exponential rate. As scholars and classroom teachers, we need to be better informed into the predictors of its usage so that we can best decide how and when to employ the emerging technologies in the most appropriate manner. This study provides an initial investigation that should be helpful in predicting the usage of emerging collaborative technologies.

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