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Social Media as a Critical Pedagogical Tool: Examining the Relationship between Youths' Online Sociopolitical Engagements and Their Critical Consciousness

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ABSTRACT

Social injustices are commonly discussed on social media, presenting opportunities for youth to engage with this content and develop into engaged citizens. While much has been written about youths' online activism, less is known about how engaging with sociopolitical content may build their capacity for activist work. We explore the extent to which youths' engagement with sociopolitical content on various social media platforms is associated with critical consciousness—an awareness of inequities, the motivation to address them, and action that combats injustice. To investigate this relationship, we conducted a survey with 339 high school-aged youths. While sociopolitical engagement on some platforms was positively associated with youths' critical consciousness measures, sociopolitical engagement on other platforms was negatively associated. Qualitative post-hoc analysis was used to suggest reasons for possible differences. In light of our findings, we discuss the relationship between online sociopolitical engagement and critical consciousness and suggest directions for future work.

CCS CONCEPTS

• **Human-centered computing** → *Empirical studies in collaborative and social computing; Empirical studies in HCI;*

KEYWORDS

critical consciousness, social media, participatory politics, political participation, youth, sociopolitical issues, civic engagement

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1 INTRODUCTION

Over the last decade, activists have used social media to raise awareness of ongoing sociopolitical issues and mobilize others toward social change. For instance, politicians and celebrities use Twitter to share their political opinions [75], content creators on TikTok post videos of ongoing social injustices around the world [67], and large-scale protests are mobilized over Facebook [45, 55]. As a result, social media has, to some extent, democratized politics for the masses and has especially given a platform for marginalized and underrepresented groups to speak out against social injustices [61, 63]. Particularly, youth are now the ones most likely to engage with sociopolitical content over social media [5, 12] and have been observed to use social media as a tool for social activism [60, 63, 129]. Social media platforms afford opportunities for youth to engage with sociopolitical issues that can subsequently influence their development as active participants of civic life [134].

We refer to sociopolitical issues as societal concerns that are influenced by social and political factors, such as social identities, environmental stressors, and policies. One way to understand *why* sociopolitical issues, such as poverty, crime, or poor educational outcomes, occur is through a critical analysis of how systems of power discriminate and oppress certain groups over others [106, 126, 127]. For example, racial, gender, and income inequality are observed among Black, LGBTQ+, and low-SES communities—not because of differences in social characteristics, culture, and upbringing as compared to their majority counterparts—but primarily due to those in positions of power making decisions that perpetuate inequities (e.g., [2, 91, 98, 122]). When institutions and individuals in power enact inequitable policies, for example, they inhibit marginalized communities' access to equal opportunities for well-being and advancement. Therefore, a critical approach to studying sociopolitical issues views these problems as rooted in systems that privilege certain groups over others by design, perpetuating inequalities and subsequently maintaining the oppressed status of marginalized groups.

Liberation from systems of oppression requires one's capacity to analyze and act against them. This capacity to liberate is what Paulo Freire [41, 42] refers to as *critical consciousness*. Specifically,

critical consciousness involves three distinct but interconnected components: 1. *critical reflection*, which is the awareness of oppressive systems that create and perpetuate social inequalities; 2. *critical motivation*, which is the motivation to take action against systems of oppression; and 3. *critical action*, which is the civic and sociopolitical actions to combat oppressive systems [24, 59, 125]. Notably, these components of critical consciousness are meant to critique and challenge systems of oppression, going beyond rote knowledge of political events and civics.

Although researchers have studied critical consciousness development through traditional school and program-based curricula [59, 104] and have recently made strides to measure and quantify youths' critical consciousness [24], they have yet to explore how youths' sociopolitical engagement on social media is related to their critical consciousness. By studying this relationship, we provide insight into how social media and social computing platforms can be designed and used to support youths' critical consciousness. Subsequently, the use and design of online spaces for critical consciousness-building is a crucial step towards building and sustaining a more engaged citizenry and equitable democracy.

Seeing a clear gap in the research literature, we conducted an online survey with high school-aged youth in the United States and used multiple linear regression and thematic analysis to investigate the nature of youths' sociopolitical engagement on different social media platforms. We aim to understand the relationship between social media use and critical consciousness—specifically elucidating how social media platforms, content, and users currently facilitate and hinder an environment where critical consciousness can occur.

Our focus on youth specifically—as opposed to people of all ages—is motivated by key trends in social media use, online sociopolitical engagement, and critical consciousness development. First, survey research has found that youth are more likely than adults to use social media as a source for news [121] and trust information on social media [73], suggesting a generational difference in news consumption and attitudes towards content on social media. Second, sociopolitical engagement on social media is more common among youth than adults, with youth more likely to use social media to advocate for social change and search for information about social and political causes [5]. Given that youth often have little or no access to conventional forms of civic engagement, such as voting, running for office, and participating in community decision-making, online sociopolitical engagement may be one of the few ways youth can participate in civic life. Finally, individuals' sociopolitical views are more susceptible to change when young [4], suggesting that critical consciousness may be more easily influenced and shaped among youth than adults. When considering these differences, we contend that the relationship between sociopolitical engagement on social media and critical consciousness is quantitatively and qualitatively different for youth than adults. Therefore, youth should be a population of focus as important nuances may not be captured by only studying the broader population.

From our quantitative analysis, we found significant positive and negative associations between youths' sociopolitical engagement on specific social media platforms and critical consciousness components. Critical reflection was positively associated with sociopolitical engagement on TikTok but negatively associated with such

engagement on YouTube; critical motivation was positively associated with Instagram and YouTube sociopolitical engagement but negatively associated with sociopolitical engagement on Snapchat; and critical action was positively associated with sociopolitical engagement on Instagram. Through our qualitative analysis, we found that sociopolitical discourse on social media and content tied to one's lived experiences may contribute to youths' critical consciousness development; however, overexposure to sociopolitical content, fear of antagonism from others online, and sentiments of excessive content moderation present possible threats to youths' development as they sociopolitically engage on social media.

From these findings, we explain how social media platforms may exist as educational tools that support youths' critical consciousness. We also discuss the potential for civic programs to incorporate social media into their civic education curricula as an additional and complementary resource for raising youths' critical consciousness. Finally, we discuss how social computing researchers can build on this study, discussing opportunities for future work.

We present research on an understudied topic in HCI by building upon literature in social media, critical consciousness, and civic education. Specifically, we extend existing literature on critical consciousness development (e.g., [59]) and youths' online sociopolitical engagement (e.g., [5, 63]) by presenting findings suggesting that critical consciousness development may be occurring on social media. Although previous work in HCI and related fields have studied people's engagement with social and political issues on social media and its effects [20, 89, 96, 109, 123], minimal work has particularly examined social media and social computing systems as sites that facilitate critical consciousness. We contend that studying this phenomenon is aligned with the field's broader goals of promoting social justice [39, 40] and democratic forms of engagement through computing [28]. Consequently, this study motivates future HCI work to examine critical consciousness development on social media and design social computing systems that facilitate critical consciousness in order to promote these agendas. Indeed, in light of recent policy proposals throughout the United States to ban educators from teaching institutionalized discrimination and systemic inequities (e.g., [30, 79, 81]), our work emphasizes the importance of social media platforms as social computing systems for supporting critical consciousness and consequently preserving a democracy where a plurality of views are represented.

2 RELATED WORK

2.1 Critical Pedagogy: The Framework for Developing Critical Consciousness

Individuals develop a critical consciousness through an education grounded in critical pedagogy. Paulo Friere [41, 42] describes this kind of pedagogy as a philosophy of teaching that examines and critiques systems of oppression through dialogue. According to him [41], dialogue involves the listening and sharing of lived experiences of oppression in which individuals see each other as political equals within the educational setting. When non-hierarchical dialogue around lived experiences of oppression occurs within this context, individuals awaken to question their position in society and are inspired to act against oppressive systems of power [41].

As historical examples, the creation of schools for liberatory education and consciousness-raising groups by Black and feminist activists respectively portray an educational framework rooted in critical pedagogy. Within the Black/African American tradition, schools for liberatory education, such as Citizenship Schools and Freedom Schools, were created to teach Black youth to critically evaluate their oppressed position in the United States and motivate them towards political activism [87, 124]. Within these schools, students and teachers were considered equals in the classroom—both learning from and teaching one another—to instill Black students with dignity and empowering them towards social change [72, 95]. In the 1970s, the feminist movement in the United States adopted a similar pedagogical framework for raising awareness of political systems that discriminated against women. Feminists created consciousness-raising groups that brought women together to share personal narratives of gender discrimination with each other to illuminate broader systems of oppression [3].

Given that the formation of critical consciousness is rooted in a framework of critical pedagogy that has historically been implemented within physically-situated social spaces, the purpose of this study is to understand the potential role and implications of online social spaces, namely social media platforms, as a critical pedagogical tool. Specifically, we examine Facebook, Twitter, Snapchat, Instagram, TikTok, and YouTube because of their historical popularity among youth [118]. Through this work, we seek to understand how the extent of sociopolitical engagement on these platforms is associated with one's level of critical consciousness and how social media can support or hinder critical consciousness. As such, we discuss the factors that facilitate critical consciousness and propose research questions based on prior work.

2.2 Social Media: Sites for Sociopolitical Engagement & Learning

Since the early inception of social media platforms, such as Facebook and Twitter, researchers have studied the use of social media as informational media and its relationship to offline political behaviors. Early work has examined the effects of political content and news consumption on these platforms. Research suggests that increased exposure and consumption of political news and content is tied to increases in voter turnout for elections [10] and other forms of civic engagement, such as volunteering, raising money for charity, or participating in civic programs [46, 77, 110, 112, 134]. Given the informational qualities of social media for supporting civic engagement, these platforms can enable individuals to learn and reflect upon sociopolitical issues as well. In fact, findings from representative surveys suggest that individuals who use social media expose themselves to more diverse political content than compared to individuals who did not [35, 36]. However, other work suggests that exposure to political content on social media does not lead to significant gains in political knowledge [9, 31, 70]. One explanation for the lack of political learning over social media is that although social media is an informational medium that is conducive to passive learning [9], users do not proactively seek out and learn about politics on these platforms unless they are already interested in politics [47]. Instead, users expect political news to be incidentally exposed to them [47]. Overall, evidence suggests that social media

use can expose individuals to diverse sociopolitical content and increase civic engagement but does not increase political knowledge without users actively seeking that information.

Aside from social media as informational media, platforms also exist as networked media for individuals to engage in sociopolitical issues with others online. Sociopolitical engagement on social media is especially prevalent among those who identify as women, Black, youth, or liberal-leaning in the United States [5, 11, 12]. For youth in particular, social media platforms, such as Twitter and TikTok, have become popular sites to advocate for sociopolitical causes [68, 90, 111], raise awareness of ongoing systemic inequities [44, 89, 129], and facilitate democratic forms of collective action [63, 85, 139]. Contrary to evidence that suggests a decline in civic and political engagement among youth [23, 94, 116], research suggests that youth are adapting their engagement in civic affairs and shifting away from conventional politics as social media becomes ubiquitous in youths' everyday lives [7, 63]. Indeed, one way in which youth have appropriated social media for sociopolitical engagement is through sharing personal experiences of oppression to raise awareness of systemic inequities [90, 111, 129]. In turn, this change in online engagement on social media for politics presents a shift away from rote forms of civic and political learning and towards a knowledge of politics that is personal, social justice-oriented, and identity-driven.

Much of the existing literature has discussed social media's relationship to offline political and civic behavior and sociopolitical interactions on social media. However, to our knowledge, there has been minimal literature on how the use of social media for sociopolitical purposes supports one's critical consciousness; even less work specifically examines youth. Although previous work has studied the relationship between social media engagement and offline political and civic behaviors, critical consciousness is distinct in that its emphasis is on systemic change that is liberatory in nature. Namely, critical consciousness does not only consist of civic engagement and political participation but also the capacity to analyze systems of oppression and the motivation to enact social change as an act of liberating the oppressed [42]. Given this existing gap in the research literature and that youth are the main demographic who use these platforms, we argue that—from both an academic and practical standpoint—research on social media use and youths' critical consciousness development is important to investigate. As such, we propose the following research questions:

RQ1: To what extent is youths' frequency of sociopolitical engagement on social media associated with their (a) critical reflection, (b) critical motivation, and (c) critical action?

Based on the existing research literature on social media and sociopolitical engagement, we also hypothesize the following:

H1: Youths' frequency of sociopolitical engagement on social media will be positively associated with their level of (a) critical reflection (b) critical motivation, and (c) critical action.

To also qualitatively assess youths' sociopolitical engagements on social media and the interactions found therein, we also ask the following research question:

RQ2: How does sociopolitical engagement on social media support or hinder youths' critical consciousness?

2.3 Civic Programs: Developing Critically Conscious Youth

In recent years, scholarship in critical consciousness has been interested in examining the construct among youth in the classroom. Over a five-year longitudinal study that evaluated five different schools with a critical pedagogical framework, Seider and Graves [104] found common themes among the school environments that facilitated Black and Latinx youths' critical consciousness. Specifically, they cited civic engagement opportunities, social spaces for students and teachers to share personal narratives of oppression, and culturally relevant educational material as critical for raising youths' awareness of systemic inequities (i.e., critical reflection), inspiring them to act against sociopolitical issues (i.e., critical motivation), and engaging them in actions that advocate for social change (i.e., critical action) (see also [21, 105, 107]). Similar research has also found that open dialogue of sociopolitical issues in school [52], the presence of teachers and adult mentors who support open dialogue of sociopolitical issues [19, 26, 43], and perceptions of close relational ties among peers and teachers [92] all contribute towards the development of critical consciousness among racially minoritized youth. Interestingly, findings from Diemer et al. [25] suggest that school principals who support youths' critical consciousness development but are perhaps relationally removed from youths' social periphery may not affect youths' critical consciousness, reinforcing the importance of close relational ties in critical consciousness development.

A growing body of work has also explored the formation of critical consciousness outside the classroom. Evidence suggests that civic programs utilizing critical pedagogy along with adult mentorship and peer support effectively facilitate youths' critical consciousness [43, 48, 49, 69]. These programs provide youth with peers and adult mentors to support their critical learning [43, 48, 131], equip them with skills and knowledge for critiquing systemic inequities [49, 82], and provide opportunities for them to engage in social change [38, 56]. Critically important among these kinds of civic programs is the opportunity for youth, peers, and adults to share personal experiences of oppression with each other. These personal narratives are connected to one's racial, ethnic, or cultural identities, are discussed in the context of inequalities perpetuated by systems of power, and are meant for youth to self-reflect on their oppressed position in society [53, 100].

Given the role of civic programs as spaces that develop youth into active and critically conscious citizens and previous work that suggests social media use influences civic engagement (see Section 2.2), we include civic program participation as a covariate in our regression analysis.

2.4 Historically Marginalized Populations: Connecting Demographic Characteristics to Lived Experience

How an individual experiences the world is shaped by one's social identity. Factors such as gender, race/ethnicity, socioeconomic status, age, and political ideology influence individuals' relations with others, their interactions with them, and interpretations of culture and society. Because critical consciousness develops through an

awareness of oppressed positions in society [41], we consider demographic characteristics—as a proxy for one's lived experiences—to be influential over critical consciousness development. In the following paragraph, we briefly discuss previous literature to motivate our use of demographic variables in our linear regression analysis.

Due to life experiences, it is likely that marginalized groups become aware of their oppressed positions in society and are motivated to take action to break free from that oppression. Prior work has found that racial and ethnic minoritized groups are less trusting of government institutions than their majority White counterparts [6, 83, 130], suggesting a situated knowledge of power that stems from one's subjugated position in society [54]. Indeed, statistics show that Black youth are disproportionately incarcerated by the justice system compared to their White counterparts [99, 101] with both Black and Latinx youth more likely to report experiencing some form of institutional racism compared to White youth [33]. Therefore, it stands to reason that Black and Latinx youth report greater commitments to preserving the civil liberties of their own racial or ethnic group [34]. Kiang et al. [64] also found that females identified more strongly as an oppressed minority when compared to their male counterparts, exhibited greater awareness of systemic inequities (see also [132]), and felt more politically efficacious. Although a liberal political ideology is not considered an oppressed position, research also suggests that liberals may be more aware of systemic inequities than conservatives [132], perhaps by proxy that marginalized groups are more likely to adopt a liberal political ethos [17, 18]. It is also worth noting that age differences may influence one's capacity to critically reflect upon the world. Diemer et al. [27] found that older youth are more likely to be aware of systemic inequities than those who are young, suggesting that youth have more experience and development to reflect and analyze systemic inequities as they grow older. These findings across race/ethnicity, gender, political ideology, and age suggest that historically marginalized groups, due to their lived experiences of oppression, facilitate greater awareness of systemic inequities and motivation to address them.

Not only are historically marginalized youth more aware of systemic inequities and motivated to act against oppression, but they also take action more frequently than their majority counterparts. Godfrey and Cherng [51] found that sociopolitical engagement among low-income youth increases as income inequality increases, which suggests that the lived experiences of economic inequality motivate low-income youth to take action to rectify these disparities. Similar evidence suggests that racial and ethnic minoritized groups are more likely to take sociopolitical action in the face of systemic racism in an attempt to create social change [86]. Overall, marginalized groups are seemingly more likely to act against systems of oppression in the face of social inequities to liberate themselves from their oppressed position.

Given that sociopolitical engagement on social media (see Section 2.2) and critical consciousness both differ based on demographic characteristics, we also consider gender, race/ethnicity, socioeconomic status, age, and political ideology as covariates in our linear regression models.

3 METHODS

3.1 Participants & Data Collection

We created an online survey that quantitatively measured participants' critical consciousness and the frequency of sociopolitical engagement on multiple social media platforms to investigate social media's potential as a critical pedagogical tool. As part of this survey, we also asked participants about their use of social media and how it supported or hindered their knowledge of and engagement with sociopolitical issues to qualitatively assess our quantitative data.

The survey targeted high school-aged youth (i.e., 14-18 years old) in the United States. Participant recruitment and data collection for the survey were conducted by SoapBoxSample from March to July 2022. SoapBoxSample employs a quota sampling method with quotas created to generate a sample that is similar to the United States population across race/ethnicity, geographic region, and socioeconomic status. The median response time was 11.08 minutes ($M = 20.54$, $SD = 63.66$) with a survey completion rate of 60.2%. Upon completion of the survey, participants received \$2.00 USD from SoapBoxSample. This survey was approved by the Georgia Institute of Technology IRB. Online consent to participate in the study was obtained from respondents before they completed the survey.

Prior to removing low-quality responses, a total of 665 participants participated in the survey. To mitigate low-quality responses, we (1) employed a quality assurance question, (2) checked that open-ended responses in the survey were sensible, and (3) checked for straight-lining in multiple-choice questions. A total of 265 participants were removed. After re-coding multiple-option and open-response demographic questions (i.e., questions about race/ethnicity, gender, and socioeconomic status), we also excluded an additional 61 participants from the dataset who did not fit into any category in those categorical variables. As a result, a final sample of 339 participants was used in our analysis.

3.2 Measures

3.2.1 Independent Variables: Sociopolitical Engagement. We adapted questions from a survey conducted by Vromen et al. [119] that measured participants' sociopolitical engagement frequency on social media. Specifically, we measured sociopolitical engagement across six different social media platforms including Facebook ($\alpha = .94$, $M = 1.74$, $SD = .874$), Twitter ($\alpha = .93$, $M = 1.89$, $SD = .917$), Snapchat ($\alpha = .93$, $M = 1.80$, $SD = .862$), Instagram ($\alpha = .93$, $M = 2.32$, $SD = .960$), TikTok ($\alpha = .93$, $M = 2.24$, $SD = .999$), and YouTube ($\alpha = .88$, $M = 2.43$, $SD = .815$).

Sociopolitical engagement frequency was measured using a 4-point Likert scale (1 = *Never*; 4 = *Regularly*). Seven items comprised the measurement, such as "How often do you learn about political, social, or local issues by seeing what others post through the following social media platforms?" and "How often do you post content that you have created (e.g., posts you've written, videos or stories you've created, etc.) about political, social, or local issues on the following social media platforms?"

3.2.2 Dependent Variables: Critical Consciousness. We used the Short Critical Consciousness Scale (ShoCCS) [24] to measure critical consciousness among our participants. The scale contains a total of 13 items but separates critical consciousness into three distinct components: *critical reflection*, *critical motivation*, and *critical action*. Questions used in the scale reflect one's perceived social inequities of commonly marginalized groups (e.g., racial/ethnic minorities, women, low-SES), the motivation to correct social inequalities, and the frequency of actions one takes to fight for social change.

Critical Reflection ($\alpha = .90$, $M = 4.14$, $SD = 1.37$) is measured using a 6-point Likert scale (1 = *Strongly Disagree*; 6 = *Strongly Agree*). Four items measured critical reflection: "Certain racial or ethnic groups have fewer chances to get good jobs", "Certain racial or ethnic groups have fewer chances to get ahead", "Women have fewer chances to get ahead", and "Poor people have fewer chances to get ahead". Cronbach's alpha was greater than 0.7, meaning the Likert scale used to measure critical reflection shows sufficient internal reliability.

Critical Motivation ($\alpha = .83$, $M = 4.54$, $SD = 1.12$) is measured using a 6-point Likert scale (1 = *Strongly Disagree*; 6 = *Strongly Agree*). Four items measured critical motivation: "It is important for young people to know what is going on in the world", "It is important to correct social and economic inequality", "It is my responsibility to get involved and make things better for society", and "People like me should participate in political activity and decision making of our country".

Critical Action ($\alpha = .91$, $M = 1.74$, $SD = .996$) is measured using a 5-point Likert scale (1 = *Never did this*; 5 = *At least once a week*). Five items measured critical action: "Participated in a civil rights group or organization", "Participated in a political party, club, or organization", "Contacted a public official by phone, mail, or email to tell him/her how you feel about a particular social or political issue", "Joined in a protest march, political demonstration, or political meeting", and "Participated in a human rights, gay rights, or women's rights organization or group."

3.2.3 Covariates. We asked participants about their participation in civic programs and had them self-identify based on their gender, race/ethnicity, age, and political ideology. Additionally, we collected information about their household to evaluate their socioeconomic status.

Civic Program Participation: We adapted questions from a survey conducted by Cohen and Kahne [22] that measured participant's frequency of sociopolitical engagement in civic-minded organizations in the past year using a 4-point Likert scale (1 = *Never*; 4 = *More than 3 times*). Four items comprised the construct: "Been involved in a project to help those in your community to address a problem or need in your community", "Learned about current issues affecting your community", "Felt encouraged to talk openly about social or political issues where people have strong disagreements", and "Discussed how to effectively share your perspective on social or political issues online (e.g., by blogging or tweeting)" ($\alpha = .90$, $M = .700$, $SD = .934$).

Gender: We used guidelines suggested by Spiel et al. [114] for creating gender options in surveys. Answer options included "Man", "Woman", "Non-binary", "Prefer to self-describe", and "Prefer not to say". Whenever "Prefer to self-describe" was chosen, we examined

the free-response answer and, if possible, re-coded the answer to fit into an existing category.

Race/Ethnicity: We asked participants the following two-part question: “Are you of Hispanic, Latino, or Spanish origin?” and “What race do you consider yourself to be?”. Respondents who answered “Yes” to the first question were re-categorized as “Hispanic/Latinx.” “White or Caucasian”, “Black or African American”, “American Indian or Alaskan Native”, “Asian”, “Native Hawaiian or Other Pacific Islander”, and “Some other race (Please describe)” were listed as options for the second question. Guided by previous work for treating race/ethnicity variables [71, 76], we collapsed responses that chose multiple races into one race using a deterministic whole assignment approach. We determined that multi-race responses would be re-categorized as the race with the most responses before assignment. Additionally, “Asian” and “Native Hawaiian or Other Pacific Islander” were combined together into one category. Free-response answers were examined and re-coded where possible. Because responses with only “American Indian or Alaskan Native” were too few for meaningful analysis, we removed these responses.

Political Ideology: We asked participants to choose the political view that best represented them along a liberal-conservative spectrum: “Extremely Liberal”, “Liberal”, “Slightly Liberal”, “Moderate”, “Slightly Conservative”, “Conservative”, “Extremely Conservative”, and “I don’t know.” Responses that denoted a liberal ideology were grouped together as “Liberal” while responses that denoted a conservative ideology were grouped together as “Conservative.” “I don’t know” was used to denote a lack of political ideology (i.e., apolitical).

Socioeconomic Status: We asked participants to identify each caregiver (e.g., mother, father, guardian) in the household and the caregiver’s highest level of education that they have achieved. Based on guidelines from survey researchers [57], this question serves as a proxy for measuring low and high socioeconomic status (SES). Specifically, SES was assessed based on the highest level of educational attainment among the caregivers in the household. Low-SES included caregivers having no higher than a high school education, while high-SES included caregivers with at least some post-secondary education.

3.3 Open-Response Questions

We also asked participants to share their attitudes regarding how social media use can impact their critical consciousness. Specifically, we asked respondents two questions: (1) “How does social media help you learn about, become motivated to address, or take action to address political, social, or local issues in society or in your community?” and (2) “How does social media stop you from learning about, becoming motivated to address, or taking action to address political, social, or local issues in society or in your community?” Out of the 339 participants, 83% of participants chose to respond to at least one of the open-response questions.

3.4 Data Analysis

We performed multiple linear regression analyses [62] and computed standardized regression coefficients. Standardization was done so that the effect sizes of independent variables and covariates

within a model can be compared [14, 103]. Additionally, demographic variables were dummy-coded so that categorical predictors could fit in the model. For the categorical predictors, those in the majority group (i.e., Man, White/Caucasian, Republican, High-SES) were set as the reference category. We also conducted a set of assumption checks and considerations to ensure that the models were valid. Please refer to Appendix C for further explanation.

To better explain the findings we observed in our regression analysis, we also qualitatively coded our participants’ responses to the open-response questions in our survey. We used the quantitative findings from our regression models to guide our qualitative analysis. Following an open coding procedure akin to the inductive process found in thematic analysis [13], the first author first generated a set of lower-order codes to describe concepts present in the data. These codes were then grouped to form higher-order codes, such as *Hearing Various Sociopolitical Viewpoints*, *Feeling Overwhelmed by Sociopolitical Content*, and *Algorithms Pushing Content Based on Personal Interests*. Afterwards, the first author grouped higher-order codes into themes. For more information about the codes and themes we generated, please refer to Appendix B.

4 FINDINGS

4.1 Descriptive Statistics

To situate our later findings, we first present descriptive statistics on the amount of time our participants spent on social media for any purpose (see Table A1) and for sociopolitical issues (see Table A2). When using social media for any purpose, participants in our sample tended to use Snapchat, TikTok, Instagram, and YouTube for longer periods per day compared to other social media platforms. For instance, 72.6% of participants reported spending at least 30 minutes per day on YouTube. In contrast, participants infrequently used Facebook and Twitter, with 57.2% and 52.5% of them reporting not using the platform at all in the past week.

When using social media for sociopolitical purposes, participants reflected similar usage patterns. Respondents in our sample tended to use older social media platforms (i.e., Facebook and Twitter) less frequently than newer ones. Interestingly, whereas 47.5% of participants reported using YouTube for more than 90 minutes per week, only 18.0% of them spent that same amount of time using the platform for sociopolitical purposes. This finding suggests that youth may perceive YouTube more as an entertainment platform than a space for learning about sociopolitical issues.

In addition, we report on the demographic information of our sample (see Table 1). We also created a correlation table of key study variables to examine associations before conducting our linear regression analysis (see Table 2).

4.2 Multiple Linear Regression Analysis

To answer RQ1 (*To what extent is youths’ frequency of sociopolitical engagement on social media associated with their (a) critical reflection, (b) critical motivation, and (c) critical action?*), we fit three multiple linear regression models to explain the degree to which the frequency of sociopolitical engagement on Facebook, Twitter,

Table 1: Demographic Information of the Sample

	Overall ($N = 339$)
Age (years)	
Mean (SD)	16.6 (1.27)
Median [Min, Max]	17.0 [14.0, 18.0]
Geographic Region	
Northeast	75 (22.1%)
Midwest	74 (21.8%)
South	103 (30.4%)
West	87 (25.7%)
Gender	
Man	153 (45.1%)
Woman	165 (48.7%)
Non-binary	21 (6.2%)
Race/Ethnicity	
White/Caucasian	158 (46.6%)
Black/African American	61 (18.0%)
Hispanic/Latinx	82 (24.2%)
Asian/Pacific Islander	38 (11.2%)
Socioeconomic Status	
High-SES	263 (77.6%)
Low-SES	76 (22.4%)
Political Ideology	
Conservative	61 (18.0%)
Moderate	67 (19.8%)
Liberal	125 (36.9%)
Apolitical	86 (25.4%)

Snapchat, Instagram, TikTok, and YouTube is significantly associated with critical reflection, critical motivation, and critical action while controlling for the covariates (see Table 3).

For critical reflection (Model 1), we find that a greater frequency of sociopolitical engagement on TikTok ($\beta = .15$, $RSE = .06$, $p < .05$) is significantly associated with a higher level of critical reflection in our sample. By contrast, we find that a greater frequency of sociopolitical engagement on YouTube ($\beta = -.15$, $RSE = .06$, $p < .01$) is significantly associated with a lower level of critical reflection. The frequency of sociopolitical engagement on other social media platforms is not significantly associated with the level of critical reflection. Independent variables and covariates in Model 1 explain 42.7% of the variance in critical reflection.

For critical motivation (Model 2), we find that a greater frequency of sociopolitical engagement on YouTube ($\beta = .13$, $RSE = .06$, $p < .05$) and Instagram ($\beta = .15$, $RSE = .06$, $p < .05$) is significantly associated with a higher level of critical motivation in our sample. However, we find that a greater frequency of sociopolitical engagement on Snapchat ($\beta = -.20$, $RSE = .06$, $p < .01$) is significantly associated with a lower level of critical motivation. The frequency of sociopolitical engagement on other social media platforms is not significantly associated with the level of critical motivation. Independent variables and covariates in Model 2 explain 37.3% of the variance in critical motivation.

For critical action (Model 3), we find that a greater frequency of sociopolitical engagement on Instagram ($\beta = .15$, $RSE = .08$, $p < .05$) is significantly associated with a higher level of critical action in

our sample. However, the frequency of sociopolitical engagement on other social media platforms is not significantly associated with the level of critical action. Independent variables and covariates in Model 3 explain 39.9% of the variance in critical action.

From our regression models, we highlight three findings of note. Overall, we find that the more participants sociopolitically engage on particular social media platforms, the more they exhibit higher levels of critical consciousness, which aligns with our **H1** hypothesis (*Youths' frequency of sociopolitical engagement on social media will be positively associated with their level of (a) critical reflection (b) critical motivation, and (c) critical action*). However, sociopolitical engagement on a single platform is not positively associated with all three critical consciousness components, bringing us to consider *why* sociopolitical engagement on specific social media platforms is associated with some components but not others. Perhaps more interestingly, we find that online sociopolitical engagement on certain social media platforms is *negatively* associated with critical consciousness components. This finding raises questions about *what* youth consider whenever they create and consume sociopolitical content on social media and *how* they interact with content to the extent that sociopolitical engagement might be negatively related to components of critical consciousness. Thus, we turn to our qualitative findings to unpack why we observe these results and the relationship between sociopolitical engagement and critical consciousness.

4.3 Qualitative Post-hoc Analysis

To answer **RQ2** (*How does sociopolitical engagement on social media support or hinder youths' critical consciousness?*) and elucidate our quantitative findings from our analysis, we also report on our qualitative findings from the responses to our two open-response survey questions. In our sample, only 16.8% ($N = 57$) of our participants did not respond to either question; thus, we obtained a large volume of responses. However, many of the remaining 282 responses were short one-sentence answers that offered minimal details. The lack of detail in these responses limits us from providing a descriptively rich account of youths' sociopolitical engagements on social media and their relationship to critical consciousness components. Nonetheless, our qualitative analysis produced three themes that provide insights into how social media, broadly speaking, can support or hinder youths' critical consciousness and that complement our quantitative results.

We first explore the sociopolitical content youth find on social media, highlighting particular properties of the content that can support or hinder their critical consciousness. Second, we describe how recommender systems and content moderation hide and reveal sociopolitical content, impacting youths' critical consciousness development. Finally, we report on youths' interactions with others on social media, emphasizing the importance of online communities and sociopolitical discourse for developing critical consciousness.

4.3.1 Online Sociopolitical Content: Properties that Influence Youth.

For many respondents, sociopolitical content on social media acts as information that raises their awareness of ongoing sociopolitical issues and reveals opportunities to push for social change. Nonetheless, youth may be skeptical of the information they see online

Table 2: Pearson Correlations For Key Study Variables

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Critical Reflection (1)										
Critical Motivation (2)	0.52***									
Critical Action (3)	0.21***	0.05								
Facebook (4)	-0.02	-0.01	0.34***							
Twitter (5)	0.05	0.11*	0.29***	0.38***						
Snapchat (6)	0.00	-0.07	0.41***	0.54***	0.36***					
Instagram (7)	0.18***	0.15**	0.44***	0.43***	0.31***	0.61***				
TikTok (8)	0.20***	0.13*	0.41***	0.41***	0.41***	0.58***	0.61***			
YouTube (9)	-0.08	0.05	0.36***	0.38***	0.45***	0.45***	0.30***	0.39***		
Civic Program (10)	0.30***	0.30***	0.43***	0.11	0.13*	0.10	0.22***	0.18***	0.22***	
Age (11)	0.08	0.02	0.16**	0.09	0.08	0.13*	0.19***	0.05	0.01	0.15**

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

or feel constantly inundated by sociopolitical content, dissuading youth from viewing such content or taking action.

Respondents mentioned that the content they consume on social media informs them of ongoing sociopolitical issues (33.7%; $N = 95$), with some characterizing content on social media as easily accessible (2.13%; $N = 6$) and niche (2.84%; $N = 8$):

“Social media has provided me [with] information on so many issues and given me resources to further research these issues. For example, a TikTok explaining the concept of white feminism has taught me a bit about the concept but I want to learn more through a book the creator recommended.” (P178)

“[Social media] kept me informed. I started making connections in my economy class with the gas prices going up. I felt that it was important for me to know about the world’s affairs, especially since the war [in Ukraine] is a big deal, and Instagram helped me gain awareness about it.” (P145)

“[Social media]... helps me see the underdogs or smaller people’s point of view instead of the big people in the mass media.” (P135)

“[Social media] provides easier and more digestible access to information that I wouldn’t have seen otherwise.” (P170)

Throughout their responses, respondents consistently mentioned that the content they viewed on social media brought their attention to sociopolitical ideas and current events, such as white feminism or the war in Ukraine. Specifically, sociopolitical content on social media is often presented in an easily understood format and covers topics that traditional news media (i.e., television, newspaper, radio, etc.) may not cover, exposing youth to different ideas, opinions, and perspectives. Sociopolitical content may not only bring an awareness of a particular issue for youth but may also further motivate them to learn more. For instance, the use of TikTok may have initially exposed P178 to the idea of white feminism—a concept that critiques ways of thinking that perpetuate existing systems of oppression—but also provided her with an additional resource for which she could better understand the concept. The accessible and niche nature of sociopolitical content and the interactions youth

have with this content to raise their awareness of ongoing issues align with the observed positive relationship between sociopolitical engagement on TikTok and critical reflection in our regression analysis. Specifically, content on TikTok may be especially critical when analyzing and discussing sociopolitical issues, illuminating systems of oppression that work to perpetuate social inequities.

On social media, exposure to sociopolitical content not only raises awareness of ongoing issues of oppression but also brings attention to actionable information for youth to consider and act on. Indeed, 9.22% ($N = 26$) of participants mentioned that the information they see on social media provides them with resources they can use to push for social change:

“Social media presents a lot of easy methods to get involved, such as petitions. There is also a lot of information online that is constantly showing up on my feeds about important issues.” (P291)

“[Social media] helps me recognize more and more issues that are actually prevalent not within just my own community, but as well with other states and countries. It also helps me realize what ways I could truly and really help by offering both online and physical advice on how to help.” (P130)

In particular, social media provides information, such as donation links to charity, event information for protests, and petition links, to open opportunities for respondents to act against sociopolitical issues. As mentioned by P291, these informative calls to action are easy to access and readily available, potentially lowering the time and effort necessary for youth to advocate for social change. The prevalence, accessibility, and actionability of this information on social media may explain why sociopolitical engagement on specific social media platforms is associated with both critical motivation and critical action, since opportunities for social change may elicit a sense of responsibility and capacity to enact such changes among youth and cause them to act. As youth become aware of ongoing sociopolitical issues, they also become aware of opportunities and avenues to advocate for social change, prompting a sense that change is possible and consequently taking action to promote such change.

Table 3: Multiple regression models explaining youths' critical consciousness

Independent Variables & Covariates	Dependent Variable:		
	Critical Reflection	Critical Motivation	Critical Action
	Model 1	Model 2	Model 3
	β (RSE) ^c	β (RSE)	β (RSE)
Constant	-0.547*** (0.125)	0.235 (0.126)	-0.131 (0.124)
Critical Consciousness^a			
Critical Reflection		0.465*** (0.061)	0.129* (0.057)
Critical Motivation	0.425*** (0.053)		-0.150** (0.055)
Critical Action	0.122* (0.053)	-0.156* (0.062)	
Sociopolitical Engagement (by Platform)^a			
Facebook	0.001 (0.053)	-0.012 (0.053)	0.106 (0.060)
Twitter	-0.040 (0.052)	0.064 (0.051)	0.006 (0.059)
Snapchat	-0.026 (0.070)	-0.197** (0.062)	0.120 (0.078)
Instagram	-0.014 (0.060)	0.148* (0.061)	0.149* (0.075)
TikTok	0.148* (0.060)	0.042 (0.064)	0.057 (0.068)
YouTube	-0.150** (0.055)	0.134* (0.063)	0.122 (0.069)
Civic Program Participation ^a	0.095* (0.048)	0.134** (0.049)	0.310*** (0.057)
Age ^a	0.033 (0.048)	-0.037 (0.052)	0.040 (0.048)
Race/Ethnicity^b (Reference: White/Caucasian) ^d			
Black/African American	-0.084 (0.141)	-0.040 (0.129)	0.261* (0.131)
Hispanic/Latinx	-0.116 (0.124)	-0.109 (0.118)	0.016 (0.107)
Asian/Pacific Islander	0.068 (0.120)	0.059 (0.121)	0.046 (0.155)
Gender^b (Reference: Man)			
Woman	0.116 (0.100)	0.172 (0.100)	-0.151 (0.096)
Non-binary	0.536** (0.205)	0.056 (0.246)	0.006 (0.188)
Political Ideology^b (Reference: Conservative)			
Liberal	0.735*** (0.139)	-0.193 (0.147)	0.262 (0.142)
Moderate	0.428** (0.145)	-0.161 (0.150)	0.096 (0.136)
Apolitical	0.502*** (0.152)	-0.518*** (0.154)	-0.041 (0.135)
Socioeconomic Status^b (Reference: High-SES)			
Low-SES	0.048 (0.112)	-0.271* (0.118)	0.191 (0.112)
Observations	339	339	339
R ²	0.460	0.408	0.433
Adjusted R ²	0.427	0.373	0.399

Note: *p<0.05; **p<0.01; ***p<0.001

a: Continuous Variable – Regression coefficients are reported as standardized coefficient (β)

b: Categorical Variable – Regression coefficients are reported as unstandardized coefficient (B)

c: All coefficients are reported with robust standard errors (RSE)

d: Categorical variables are dummy-coded with a reference category used as a comparison group

Although the information they find on social media raises their awareness of current issues, respondents were skeptical that the information they find is truthful and unbiased (18.8%; N = 53):

“Social media can often put fake things on that spread rapidly and cause lots of misinformation. Thus I am cautious about what I see and I don't take action immediately because it might be fake.” (P56)

“You have to pay more attention to the source of the information. It may not be valid, especially if it's coming from an individual rather than a larger news network, and it may be biased.” (P189)

“[Social media] brings to my attentions [sic], through peers and public profiles, similar beliefs or differing ideas which in both cases is never given nearly enough

information and therefore encourages me to do my own research on my own time with more credible sources.” (P236)

We find that participants tend to be aware and skeptical of the information they consume, critically evaluating if the information they read is potentially false or biased. However, unless participants take the time to do further research, they may not form a holistic view of a sociopolitical issue. In some cases, participants hesitated to act, perhaps in fear that their advocacy may be misinformed. Youths' skepticism towards the information they see on social media may account for the lack of significant associations between sociopolitical engagement on most platforms and critical action in our models since—as P56 describes—youth may be cautious about taking any critical action, even if they find or view actionable information on the platform frequently.

This hesitation speaks to a broader dilemma where participants expressed feeling overwhelmed by the sociopolitical content that they constantly see on social media (9.22%; $N = 26$):

“Sometimes social media becomes overwhelming and [I] have to make myself take breaks from research or interacting with political issues. [I] think social media also poses the danger of misinformation and reinforcing biases.” (P86)

“There are times where the information I see on social media is more triggering and angering than helpful to my knowledge, and at those times, I would rather do anything to avoid it than to address or educate myself on it.” (P145)

“There’s just too much information. Always something going wrong. Nothing I do can change it. I don’t like to consume as much of that content as a result. It’s pointlessly depressing.” (P167)

“I believe because there’s such an overload in social media a lot of people become desensitized to a lot of issues and sometimes just scroll or pass it because it doesn’t really affect them.” (P157)

Although the information on social media provides participants with content that can inform and educate them about ongoing sociopolitical issues, we find that the sheer amount of sociopolitical content, its polarizing nature, and the perceived negativity surrounding this content overwhelmed respondents. Consequently, respondents wanted to disengage from sociopolitical content and became unmotivated to act against sociopolitical issues because ignoring the content and issues was an emotionally healthier course of action than advocating for social change. Indeed, excessive exposure to sociopolitical content can lead youth, such as P167 and P157, to feel desensitized to the plight of marginalized populations or hopeless towards dismantling systems of oppression. This explanation may clarify why greater frequencies of sociopolitical engagement on social media may be non-significantly or negatively associated with youths' critical motivation and critical action. When youth are constantly exposed to sociopolitical content and become overwhelmed, they may feel unmotivated and consequently less

likely to advocate for social change because they either emotionally distance themselves from the content or perceive that their advocacy is meaningless.

Information on social media provides content that can help individuals become easily aware of ongoing sociopolitical issues and can provide resources for youth to take action. However, the information they find can often be biased and overly distressing, discouraging individuals from taking sociopolitical actions even when such resources are available. As such, we find that the quality of sociopolitical information on social media and how youth respond and react to this information may both facilitate and hinder critical consciousness from being realized within youth.

4.3.2 The Unintended Consequences of Social Media Recommender Systems & Content Moderation. Participants reported social media recommender systems and content moderation practices as hindrances to learning about sociopolitical issues. These systems and practices act to hide and promote certain forms of content that can create a partial, biased, and inaccurate picture of a sociopolitical issue.

Historically, researchers designed recommender systems to help users find content they would enjoy [66]. As a result, recommendations for sociopolitical content on social media are a byproduct of the system's ability to predict what a user would like. One's historical activity and personal interests on the platform inform these predictions (2.48%; $N = 7$), shaping the kind of content they subsequently see on social media:

“Since I don’t watch too many things politically related, the social media algorithms don’t bring them up on my feed.” (P253)

“It prevents you from seeing the other side. When on TikTok... it tries to show you what you are interested in. Therefore people aren’t seeing the other half on things.” (P89)

“Social media can however be draining too because... the algorithms will recommend what you have been engaging in and it’s going to eventually make up your entire feed. It takes a lot of active effort to see others things to take a break from it and it’s the reason why I stopped going on TikTok.” (P155)

Respondents observed that they may not receive sociopolitical content if the system deems that a piece of content is something youth would dislike. Consequently, exposure to sociopolitical content may be minimal if youths' social media use does not include this type of content. However, even when respondents engage with sociopolitical content, recommender systems may only present the most agreeable side of an issue while hiding content that would offer a holistic perspective. In turn, youth exposed to sociopolitical content on social media may only understand one perspective on a perhaps otherwise complex issue.

Case in point, although a small number of respondents explicitly mentioned that social media algorithms helped them become aware of sociopolitical issues (.709%; $N = 2$), those who did felt that recommender systems only pushed content that reinforces one's viewpoint and creates echo chambers (2.84%; $N = 8$):

“Social media often promotes one type of thinking kind of like a hive mind which doesn’t promote free thinking.” (P27)

“It can be easy to be stuck with the same views, like echo chambers. And after awhile, you can start only seeing your view.” (P111)

“Social media does also play a role in me not taking action because it inspires so much division and at that point no one wants to listen to the truth because their mind is surrounded by their own opinion.” (P63)

Respondents felt that recommender systems implemented on these social media platforms threaten their understanding of sociopolitical issues, pushing content that presents issues in a way that an individual will find amenable. At its worst, algorithm-induced echo chambers may even propagate content that imposes oppressive ideologies, such as white supremacy and anti-feminism, onto youth that runs counter to building critical reflection. Findings from other studies suggest that individuals can easily stumble into far-right ideologies, particularly on YouTube, through recommended content [84, 97]. Recommended content promoting oppressive ideologies may falsely portray the ones in power as victims of an unfair system, hindering youths’ ability to understand who are the oppressed and who are the oppressors. As such, the effects of recommender systems may be one reason for an observed negative association between sociopolitical engagement on YouTube and critical reflection in our regression analysis. Put simply, as recommender systems increasingly promote content that traps youth into a far-right echo chamber, youth may be inhibited in their ability to understand the realities of systemic oppression faced by marginalized groups. However, we caution against over-interpreting these sentiments of algorithmic bias, since we cannot rigorously evaluate the effects of bias from our data alone. Indeed, a large portion of respondents felt that social media provided them with a plurality of sociopolitical viewpoints (12.1%; $N = 34$), which we discuss in the next section, helping them become aware of sociopolitical issues (33.7%; $N = 95$).

Aside from recommender systems, content moderation on social media platforms may also hinder individuals from learning or becoming motivated to address sociopolitical issues (4.26%; $N = 12$):

“Sometimes Instagram can take down explicit content that needs to stay up. Sometimes the uncomfortable things are the things that are most needed.” (P28)

“Posts are sometimes taken down for being ‘too violent’ when it is to spread awareness when the government or new companies refuse to show what actually going on.” (P172)

“Sometimes it makes me less motivated to address these issues because I find that there is nothing that I can do. I recently had my comment deleted on Instagram trying to actually help with the seal killing problems in icy areas around the world with links to petitions and such. It was almost as if they didn’t want to actually help the seals and instead just wanted more views and likes and comments.” (P79)

From the perspective of our respondents, content moderators on social media removed content that was important for raising awareness and disseminating actionable information around sociopolitical issues. Interestingly, we observed that when participants, such as P28 and P79, did mention content moderation as overly restrictive, it was most often in the context of Instagram, suggesting that the platform may not be conducive for disseminating and hosting critically reflective content. In turn, restrictive content moderation may be one possible reason why we find non-significant relationships between critical reflection and sociopolitical engagement on social media platforms like Instagram since platforms may be suppressing critical dialogue that would otherwise raise one’s awareness of systemic inequities.

Overall, we find that social media does provide content that helps individuals become aware of sociopolitical issues. However, we found that some participants who explicitly discussed algorithms and content moderation practices felt hindered from obtaining a more holistic perspective of these issues, which may hinder the development of youths’ critical reflection.

4.3.3 Sociopolitical Discourse on Social Media & The Role of Online Communities. In our sample, respondents expressed the importance of online communities for hearing various perspectives on sociopolitical issues. These perspectives, sometimes presented as personal narratives, help respondents become aware of sociopolitical issues and motivate them to act. Nevertheless, online discourse on social media can sometimes be vitriolic and judgmental, causing youth to hesitate to push for social change.

We observe that youth discuss the communal nature of social media platforms and how hearing the perspectives of others on the platform both facilitates and hinders their learning of sociopolitical topics. Although participants expressed that social media platforms may recommend content that reinforces one’s existing viewpoints on such topics or that social media content is biased and false, participants also expressed how social media provided them with a platform to discuss their viewpoints (4.26%; $N = 12$) and hear other people’s perspectives on these issues (12.1%; $N = 34$):

“[Social media] gives me more information on the issue and sources that allow me to help and spread awareness. It also allows me to hear other people’s perspectives and have conversations with people about our opinions.” (P338)

“I can post information to help others, I can post my own thoughts as well as follow links from other people.” (P28)

“Just the feeling of being informed and understanding what’s happening in my community as well as in the world makes me feel motivated to be a part of some change. Seeing people my age and people I look up to such as celebrities post about political, social, and local issues makes me motivated to rise with them and learn more.” (P94)

“Through social media, I learn a lot about political and social issues because it gives me the opportunity to hear the opinions of a wide variety of people.” (P327)

Compared to other forms of informational media (i.e., newspapers, television, radio, etc.), social media platforms afford individuals to voice their sociopolitical views and hear the perspectives of others on the platform. By and large, participants consistently expressed that social media platforms were conducive to hearing the sociopolitical opinions of others, such as friends, family members, influencers, and strangers on the internet. In particular, individuals expressed that hearing the personal narratives of those affected by sociopolitical topics helped them learn more about an issue and motivated them to take action (6.74%; $N = 19$):

“Social media helps me learn and hear about many personal stories where people have had to deal with racist, homophobic, or sexist things in my community and the US in general. It helps me stay informed and more motivated to take action.” (P4)

“On Reddit and Twitter, I learn a lot about the issues faced by the working class. This taught me more about strikes and unionizing than I ever learned in school or from the news. People frequently post about their own experiences and struggles from living paycheck to paycheck and its very eye-opening. These online communities are typically uncensored and people with differing views are able to discuss their perspectives on the issues facing our country, which is very educational.” (P239)

We observe that social media content helps individuals to hear the personal narratives and lived experiences of those who face inequities, such as racism, homophobia, sexism, and socioeconomic disparities. This kind of content goes beyond online discussions and news of ongoing sociopolitical issues; instead, it raises awareness of the sociopolitical realities (i.e., systemic inequities) of others through sharing personal and experiential accounts of lived oppression. These personal narratives seem to be particularly powerful in developing individuals' critical reflection and motivation. As described by P4, when youth engage with these stories, they may become more aware of systemic oppression and increase their motivation to act against oppressive systems. Youths' engagement with these narratives of oppression that help them understand systemic inequities and prompt them with a desire to advocate for change may account for sociopolitical engagement on social media being positively associated with critical reflection and critical motivation in our regression analysis.

Although social media enables individuals to hear the viewpoints and perspectives of others, many youth in our sample also felt that the online discourse surrounding a sociopolitical issue can often be antagonistic and judgmental (12.1%; $N = 34$):

“Sometimes the content is attacking those with opposing beliefs which is very hurtful to me because I don't think people should be disliked because of beliefs, so sometimes this makes me not want to address issues in my community.” (P116)

“The overwhelmingly large spectrum of information I encounter is constantly changing, and many times two or more people online choose sides and fight against one another. Division brings about nothing less than hatred.” (P211)

“It does stop me sometimes because it can be scary to speak my opinion on a highly controversial topic. Once I state my opinion, people are open to thinking or saying whatever about me.” (P17)

“I always want to learn. However, the vicious nature of social media has made me nervous to speak out on some issues due to cyberbullying and doxxing.” (P178)

In contrast to becoming motivated by hearing personal narratives of those affected by sociopolitical issues, several participants expressed discouragement from wanting to engage in discourse or take action against these issues. Participants noted the antagonism that often persists on social media platforms, expressing fear that speaking up or taking action against sociopolitical issues would lead to retaliation and judgment by others. Similar to youths' skepticism towards content they see, the potential backlash from speaking up about these issues—as articulated by P17 and P178—may discourage rather than empower youth to act against systemic inequities. Consequently, youth may not advocate for social change out of a fear of other people's opinions. Youths' fear of retaliation from other users on social media may be another reason we found sociopolitical engagement on social media to be negatively or non-significantly associated with critical motivation and critical action. As such, we find that social media platforms provide a community where individuals can hear about other people's sociopolitical viewpoints; however, hearing these views can be both a source of motivation and discouragement to act.

5 DISCUSSION

In this study, we examine the relationship between youths' sociopolitical engagement on specific social media sites and their critical reflection, critical motivation, and critical action. From our regression analysis, we find that sociopolitical engagement on TikTok is positively associated with critical reflection, sociopolitical engagement on YouTube and Instagram is positively associated with critical motivation, and sociopolitical engagement on Instagram is positively associated with critical action. However, we also find that youths' sociopolitical engagement on YouTube and Snapchat is negatively associated with their critical reflection and critical motivation respectively. Unlike civic program participation (see Table 3), sociopolitical engagement on a single social media site does not positively correlate with all three critical consciousness components. In the following sections, we continue to unpack these quantitative results in light of the existing literature and qualitative findings and offer implications from our work.

5.1 Understanding Social Media as a Critical Consciousness-Building Tool

Our quantitative findings show that sociopolitical engagement on specific social media platforms is significantly related to youths' level of critical consciousness. However, given the use of survey data to study this relationship, we cannot make causal claims with our findings. Nonetheless, we believe in the validity of our findings because of (1) our extensive synthesis of prior work that justifies our independent variables and covariates and (2) alignment between our qualitative findings and our observed associations in the regression models. Given our confidence that real relationships exist within

our models, we detail several possible explanations for why there might be significant and non-significant relationships between youths' sociopolitical engagement on social media and their critical consciousness.

A simple explanation may be that critically conscious youth engage in politics on particular platforms more frequently because those platforms are the most popular and therefore have the broadest reach in audience. For example, TikTok and Instagram are increasingly popular among youth compared to platforms such as Facebook and Twitter [118] and are popular sites for social activism [68, 90, 136]. Youth, who are critically conscious and see the popularity and potential reach of specific social media sites, may be motivated to use these platforms to frequently create and seek content about sociopolitical issues since these are sites where a culture of social activism seems to be the most salient [47, 68, 89]. Results from our regression models seem to reflect this explanation since significant positive associations between sociopolitical engagement and critical consciousness components only occur on the most popular sites (i.e., Snapchat, Instagram, TikTok, and YouTube). We can interpret *P178*'s observations about the prevalence of sociopolitical content on TikTok this way and suggest that critically conscious creators appropriate popular platforms to share their information as a form of sociopolitical engagement. As such, youths' critical consciousness development is not a byproduct of sociopolitical engagement on social media; instead, critically conscious youth appropriate popular social media sites as activism tools to sociopolitically engage with a broad audience.

Alternatively, social media content and affordances may directly contribute to youths' critical consciousness development as they use the platform. Previous research does show that social media increases exposure to news content [36], and our qualitative analysis suggests that youth become aware of ongoing sociopolitical issues as they use social media. In particular, respondents like *P4* and *P239* spoke of the personal narratives of marginalized groups they had heard on these platforms, consequently enlightening and motivating them to act against systems of oppression. Exposure to this content may increase youths' capacity to analyze systems of oppression and motivate them to act against systemic inequities. Although other research suggests that social media use does not lead to gains in political knowledge [9, 31, 70], measures of critical consciousness are distinct from political knowledge since they relate to attitudes and beliefs about social injustices and systemic inequities and not about the capacity to recall political facts. Overall, findings suggest that exposure to content on particular social media platforms can influence youths' sociopolitical attitudes and beliefs and develop their critical reflection and critical motivation.

In all likelihood, both explanations account for the positive relationships we observe in our quantitative findings. Where positive associations between sociopolitical engagement and critical consciousness components exist, critically conscious youth may more frequently engage with sociopolitical issues on popular social media platforms, creating sociopolitical content for other youth to see. Those youth now become exposed to sociopolitical content, which can develop their critical consciousness and motivate their sociopolitical engagement on these platforms, creating even more content on sociopolitical issues. As such, the relationship between sociopolitical engagement and critical consciousness may be a mutually

reinforcing one, acting in a cyclical manner. Though supported by our data and previous work, our explanations for the observed relationships need more rigorous evaluations. We offer these potential explanations as hypotheses that researchers should further study and investigate in future work.

Yet, while sociopolitical engagement on particular social media platforms is associated with certain aspects of critical consciousness, engagement on a single platform is not associated with all three components. Consistent with previous research that examines communication practices across multiple social media platforms [37, 108, 109, 137], we adopt the view that differences in perceived audience, type of content, affordances between social media platforms, and social norms differentiate who, what, and how youth sociopolitically engage on a particular platform. We suggest that specific social media platforms may be better at developing certain components of critical consciousness than others due to subsequent differences in youths' sociopolitical engagements between platforms. Indeed, research suggests that TikTok's algorithmic affordances, sociopolitical content, and large activist community are conducive to sociopolitical learning and critical reflection [68, 78]; meanwhile, Instagram's visual content and network affordances can be appropriated to facilitate content that mobilizes users toward critical action [1, 32, 135]. As such, differences in affordances, content, audience, and norms between social media platforms differentiate how youth use platforms, consequently supporting or hindering different components of their critical consciousness.

However, the design of social media sites may also unintentionally hinder youths' critical consciousness development. From our analysis, we find some evidence that recommender systems on social media may suggest content that inhibits youths' critical reflection, particularly on YouTube. Indeed, previous research has found that YouTube's recommender system made far-right extremist content accessible through recommendations alone [84, 97, 128, 138]. As discussed in our qualitative findings, youth who frequently view sociopolitical content on YouTube may be less critically reflective because YouTube's system is prone to recommend oppressive ideologies that work to obfuscate systemic inequities. Alternatively, recommender systems may proliferate far-right content that attracts less critically reflective youth onto the platform en masse. These youth may be more likely to create and engage with far-right content that recommender systems promote to other youth on the platform, creating a less critically reflective environment that undermines youths' ability to analyze systemic inequities. These explanations most likely work together to create a mutually reinforcing relationship that researchers should closely examine in future work.

Aside from the unintended consequences of recommender systems, we also find that participants sometimes felt overwhelmed by the overly pessimistic and distressing sociopolitical content they saw on social media. In turn, respondents, such as *P167*, expressed a sense of hopelessness toward resolving sociopolitical issues, suggesting that exposure to sociopolitical content that is overly depressing may stymie one's critical motivation and critical action. This finding aligns with research on political efficacy and collective action; in particular, evidence suggests that exposure to overly distressing content on social media can demoralize otherwise politically efficacious individuals from taking collective

action [113, 115, 117]. According to this work, depictions of social injustice may compel individuals on social media to take collective action; however, when faced with intractable sociopolitical issues (e.g., systemic inequities), individuals may lose their sense of efficacy and hope for social change. Rather than motivating youth, the proliferation of content meant to expose systems of oppression may cause them to feel powerless.

Overall, these results suggest that social media, with its affordances, audience, content, and norms, can potentially facilitate critical consciousness among youth or, at the very least, attract critically conscious youth to create sociopolitical content for others to learn. However, recommender system design and over-exposure to sociopolitical content may hinder critical consciousness development or detract critically conscious youth from sociopolitically engaging on particular social media platforms. Regardless of the causal direction of our observed associations, our work contributes to understanding and characterizing social media sites as spaces where critical reflection, critical motivation, and critical action exist. In particular, these findings contribute to HCI by exploring possible opportunities and obstacles for social computing tools to be designed as critical pedagogical spaces. Future work can build upon this study, examining the explanations we have articulated as hypotheses.

5.2 Opportunities for Civic Programs to Harness Social Media as a Critical Pedagogical Tool

Historically, civic and school-based programs with critical pedagogy have been the primary sites for raising critical consciousness. Indeed, whenever educators adopt a critical pedagogical approach to create civic programs, these programs effectively raise the critical consciousness of youth [59, 104]. However, as recent educational policies in the United States have made strides to ban knowledge and discussion that can facilitate critical reflection among youth [30, 79, 81], civic programs that receive government funding may be severely limited in their capacity to incorporate curricula for developing youths' critical consciousness in the future.

Our findings speak to the possibility of appropriating social media platforms as an alternative third space in which youth can learn about structural inequities, become motivated to take action against sociopolitical issues, and act to create social change. Indeed, results from our work suggest that sociopolitical engagement on particular social media platforms can be just as effective, if not more effective, for supporting critical reflection, critical motivation, and critical action (see Table 3). Although civic programs may be limited in their capacity in the future, social media platforms provide an alternative space for youth to learn. Indeed, even when social media platforms attempt to moderate sociopolitical content, youth continuously find ways to appropriate media as online spaces for disseminating sociopolitical knowledge (e.g., [67]).

However, more importantly, we also imagine the possibility of civic programs incorporating social media content and media literacy materials to teach youth about ongoing sociopolitical issues and inspire them to advocate for social change. Given the pervasiveness of youths' use of social media as a tool for sociopolitical engagement [5, 12] and the sociopolitical content found therein

(e.g., [68, 78, 90]), we see future opportunities for civic educators to incorporate sociopolitical content on social media into their curricula to develop youth into critically conscious citizens. Already, educators utilize community dialogue, collective knowledge, and lived experiences of oppression to raise the critical consciousness of youth [38, 53, 100]. It stands to reason that sociopolitical content and discourse on social media can complement existing teaching practices to develop critical consciousness. As such, future work might evaluate the effectiveness of incorporating social media content for raising critical consciousness among youth in civic programs.

Close relational ties with adult educators in civic programs may also help mitigate the skepticism and hopelessness that youth experience when they are over-exposed to sociopolitical content on social media. Prior work has emphasized the role of adult educators within these programs as guides and support systems for youths' development as critically conscious actors [43, 104, 131]. It follows that close relational ties between adults and youth may help to sustain youths' critical consciousness by providing them with mentors whom they can trust to help analyze the validity of information on social media and encourage them to persevere when social change is seemingly intractable. As such, we recognize the need for support systems that cultivate youths' critical consciousness and sustain it through close relational ties.

As social media platforms become increasingly ubiquitous in the lives of youth and are appropriated as sites for sociopolitical engagement, collaborations between civic educators and HCI researchers can prove fruitful for pushing forward HCI's agenda for promoting social justice and democratic forms of engagement [28, 39, 40]. We contend that HCI research into youths' sociopolitical engagements on social media can better inform civic educators on how best to complement youths' online activities and support them in their political endeavors—both online and offline. Alternatively, work into studying the practices of civic educators present opportunities to question how we, as HCI researchers, ought to design social computing systems that not only develop but also sustain critical consciousness toward a more socially just society. As such, future collaborative work between HCI scholars and civic educators would prove beneficial for creating systems and curricula for raising and sustaining critically conscious youth.

6 LIMITATIONS & FUTURE WORK

Although sociopolitical engagement on various social media platforms is significantly associated with critical consciousness components among youth, we also acknowledge several limitations in our study and propose opportunities for future work.

Because the primary objective of our research was to provide an initial foray into exploring sociopolitical engagement on social media and critical consciousness development, we focused on sociopolitical engagement across a broad number of popular social media platforms. In addition, we were intentionally open-ended when asking participants about their social media use in our open-response questions but were unable to ask follow-up questions to their responses due to the nature of the study design. As such, we cannot provide a more thorough account and discussion of why

and how specific social media platforms may facilitate or hinder critical consciousness development better than others.

Future work should provide a more nuanced and qualitative account of how youths' sociopolitical engagement on specific social media platforms, such as TikTok and Instagram, might subsequently influence their critical reflection, critical motivation, and critical action. However, we also recognize that many online communities and subcultures comprise even one social media platform. Online communities, such as Black Twitter (e.g., [15, 16]) or Political TikTok (e.g., [136]), feature distinct kinds of content, discourse, and technoculture that may support or hinder critical consciousness development among youth. Youth who align with one online community and engage in critical dialogue may not see the same gains in critical consciousness when aligned with another. Researchers should not only examine specific social media platforms but also should also study the distinct communities found therein to develop a more nuanced understanding of the online communities that youth align with and the content they subsequently view. In turn, this line of work would provide more robust insights into the development of youths' critical consciousness via sociopolitical engagement on social media and provide insights for designing critical pedagogical tools in the future.

We also acknowledge that our sample only includes youth in the United States, which limits our understanding of the relationship between critical consciousness and online sociopolitical engagement among youth in other countries. Just as sociopolitical engagement on different platforms are potential factors that explain differing levels of critical consciousness among youth, the situated cultures and the politics of various countries are also possible factors that moderate youths' sociopolitical engagement on social media and their critical consciousness. For instance, countries with free speech protections, such as the United States, allow their citizens to freely express themselves politically in online spaces without fear of existential threat from governing authorities. However, authoritarian regimes like the current Azerbaijani government [88] are more likely to suppress online political speech and activism, perhaps weakening the relationship between sociopolitical engagement and critical consciousness. We suggest that youths' critical consciousness development may be hindered at scale whenever countries proactively censor or discourage critical dialogue online. We encourage future work to quantitatively assess the relationship between critical consciousness and online sociopolitical engagement of youth across different countries to shed light on possible cultural and political differences at work that could subsequently impact youths' critical consciousness differently.

In addition, the survey instrument used to measure critical consciousness may not fully capture the complexity of the construct. According to Paulo Freire [41], a key component of being a critically conscious individual is an awareness of systemic inequities (i.e., critical reflection) born through critical and empathic dialogue with others. Otherwise, beliefs of social inequalities in society may form from what they passively consume over social media or what Freire calls *massification* [41]. Previous work has also observed changes in how youth engage with politics, moving away from traditional place-based forms of civic engagement and towards collective action over digital media [63]. Thus, we note that the items for critical reflection and critical action in the ShoCCS questionnaire [24] fail

to consider how respondents become critically reflective—whether from active critical dialogue with the world or massification—and how respondents engage in critical action as new opportunities to participate in activism have emerged online.

We also recognize that ShoCCS oversimplifies the concept of oppression, implicitly defining it as a matter of unequal opportunity within the critical reflection questions. However, not all marginalized groups or individuals within the same group experience oppression the same way, nor is it simply a matter of unequal opportunities. The questionnaire also narrowly defines critical reflection, critical motivation, and critical action into specific beliefs, motivations, and ways of acting against oppression. Though these items are certainly not the only ways individuals are critically conscious, they at least provide us with a short list of how critically conscious youth would commonly believe, behave, and act [43, 48, 104]. As such, we echo previous calls to utilize qualitative studies to inform more robust quantitative measurements of critical consciousness [50, 59]. Specifically, we suggest that researchers examine how youth dialogue with sociopolitical content on social media and how they take sociopolitical action on these platforms to inform these measurements.

Similarly, our measurement for sociopolitical engagement on social media was adapted based on previous work [119], but researchers have not rigorously assessed its validity. Indeed, studies that measure sociopolitical engagement on social media primarily utilize unvalidated instruments, with validated instruments being platform-specific (e.g., [120]). However, answers from the open-response questions that discuss how participants use social media for sociopolitical purposes align with the items used to assess sociopolitical engagement on social media, suggesting face validity. Furthermore, sociopolitical engagement on social media is not constrained to the questions that we asked. For some, such as those in the LGBTQ+ community (e.g., [8, 93]), merely participating on these platforms is a sociopolitical act. More work should develop and validate measurements of sociopolitical engagement on social media and include participatory and identity-driven elements.

Finally, our survey used a quota sampling design to collect responses from youth. We recognize that such a sampling design can bias results due to its non-random nature [80], leading to biased regression estimates that cannot be generalized to the broader population. Although we attempt to mitigate possible sampling bias by using robust standard error measurements in our regression models [133], we recognize that bias may still exist and influence the results so long as sampling designs are non-random. Given the exploratory nature of this work, we suggest future work seeking to replicate this study use random sampling techniques that provide more accurate population estimates.

7 CONCLUSION

As critical pedagogy in classrooms continues to be threatened by policies that ban critical dialogue, we present social media as an alternative space for which critical consciousness can occur. Without educational spaces that uphold critical pedagogy, systems of oppression will continue to perpetuate social inequalities unchecked. As such, the relationship between sociopolitical engagement on social media and critical consciousness is worthy of study to understand

how critical pedagogical spaces online can be created and upheld to preserve an equitable democracy. Although our results suggest the possibility that the relationship between youths' critical consciousness and sociopolitical engagement on social media is mutually reinforcing, more work needs to be done to understand the causal nature of this relationship. Nonetheless, our work contributes initial empirical evidence towards understanding social media, broadly speaking, as a space for supporting and hindering youths' critical consciousness and motivates future work around studying and designing social computing platforms as critical pedagogical tools.

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A APPENDIX: ADDITIONAL DESCRIPTIVE STATISTICS

Table A1: Time Spent per Day on Social Media in General

Platform	Not used in the last week <i>N</i> (%)	< 10 min <i>N</i> (%)	10-30 min <i>N</i> (%)	31-60 min <i>N</i> (%)	61-90 min <i>N</i> (%)	>90 min <i>N</i> (%)
Facebook	194 (57.2%)	56 (16.5%)	30 (8.8%)	20 (5.9%)	8 (2.4%)	31 (9.1%)
Twitter	178 (52.5%)	57 (16.8%)	45 (13.3%)	26 (7.7%)	11 (3.2%)	22 (6.5%)
Snapchat	136 (40.1%)	41 (12.1%)	47 (13.9%)	50 (14.7%)	20 (5.9%)	45 (13.3%)
Instagram	79 (23.3%)	50 (14.7%)	46 (13.6%)	66 (19.5%)	33 (9.7%)	65 (19.2%)
TikTok	111 (32.7%)	21 (6.2%)	29 (8.6%)	38 (11.2%)	43 (12.7%)	97 (28.6%)
YouTube	17 (5.0%)	26 (7.7%)	50 (14.7%)	45 (13.3%)	40 (11.8%)	161 (47.5%)

Table A2: Time Spent per Day on Social Media for Politics

Platform	Not used in the last week <i>N</i> (%)	< 10 min <i>N</i> (%)	10-30 min <i>N</i> (%)	31-60 min <i>N</i> (%)	61-90 min <i>N</i> (%)	>90 min <i>N</i> (%)
Facebook	201 (59.3%)	60 (17.7%)	31 (9.1%)	17 (5.0%)	11 (3.2%)	19 (5.6%)
Twitter	190 (56.0%)	55 (16.2%)	42 (12.4%)	24 (7.1%)	9 (2.7%)	19 (5.6%)
Snapchat	165 (48.7%)	69 (20.4%)	34 (10.0%)	33 (9.7%)	13 (3.8%)	25 (7.4%)
Instagram	107 (31.6%)	72 (21.2%)	55 (16.2%)	45 (13.3%)	23 (6.8%)	37 (10.9%)
TikTok	131 (38.6%)	44 (13.0%)	50 (14.7%)	39 (11.5%)	28 (8.3%)	47 (13.9%)
YouTube	52 (15.3%)	88 (26.0%)	68 (20.1%)	42 (12.4%)	28 (8.3%)	61 (18.0%)

B APPENDIX: FINAL CODEBOOK

Table B1: Table of Open Codes & Themes

Themes	Open Codes	Code Definitions
Properties of Online Sociopolitical Content that Influence Youth	Bring Awareness to Sociopolitical Issues & Current Events	discussions around information on social media that influences one's awareness around a sociopolitical issue
	Covering Information Not Found on Social Media	discussions around niche and non-mainstream information that is found on social media and how it influences one's sociopolitical learning
	Unbiased/Factual Information on Social Media	discussions around social media content showing unbiased and/or factual information and how that influences one's sociopolitical learning
	False/Biased Information on Social Media	discussions around biased content on social media and how that influences one's sociopolitical learning and motivation
	Sociopolitical Resources to Take Action	discussions around resources that social media provides that influences one's ability to take sociopolitical action
	Virality of Information	discussions around the virality of social media content and how it influences one's sociopolitical learning
	Accessible & Digestible Information	discussions around the accessibility of social media content and how it influences one's sociopolitical learning

	Social Media Content Is Distracting	discussions around how social media content takes attention away from meaningful sociopolitical issues and how content discourages criticality in sociopolitical discourse
	Feeling Overwhelmed by Sociopolitical Content	discussions around the social media content that one sees and one's negative reaction to seeing this kind of content and how it influences one's sociopolitical learning and motivation to take action
The Unintended Consequences of Social Media Recommender Systems & Content Moderation	Algorithms Helping with Sociopolitical Issues	discussions around social media algorithms that help participants learn about sociopolitical issues
	Algorithms Pushing Content Based on Personal Interests	discussions around social media algorithms that hinder participants from seeing sociopolitical content and learning about sociopolitical issues
	Censorship on Social Media	discussions around content moderation policies on social media, specifically around censorship, and how it influences one's sociopolitical learning
	Reinforcing Echo Chambers	discussions around how social media platforms reinforce one's own political viewpoints
Sociopolitical Discourse on Social Media & The Role of Online Communities	Personal Narratives Around a Sociopolitical Issue	discussions around the personal nature of social media content and how it influences one's sociopolitical learning and motivation to take action (i.e., the personal is political)
	Online Space to Share Sociopolitical Viewpoints	discussions around using social media as an online space to share one's sociopolitical viewpoints
	Hearing Various Sociopolitical Viewpoints	discussions around using social media as a place to hear various sociopolitical viewpoints around an issue (i.e., opposing viewpoints, celebrity viewpoints, etc.)
	Making Light of Sociopolitical Issues	discussions around how social media influencers and content creators appropriating sociopolitical issues for fame
	Antagonism & Judgments Over Social Media	discussions around the antagonistic and judgmental nature of sociopolitical discourse over social media and how that influences one's motivation to take sociopolitical action

C APPENDIX: ASSUMPTION CHECKS & OTHER CONSIDERATIONS FOR MULTIPLE LINEAR REGRESSION MODELS

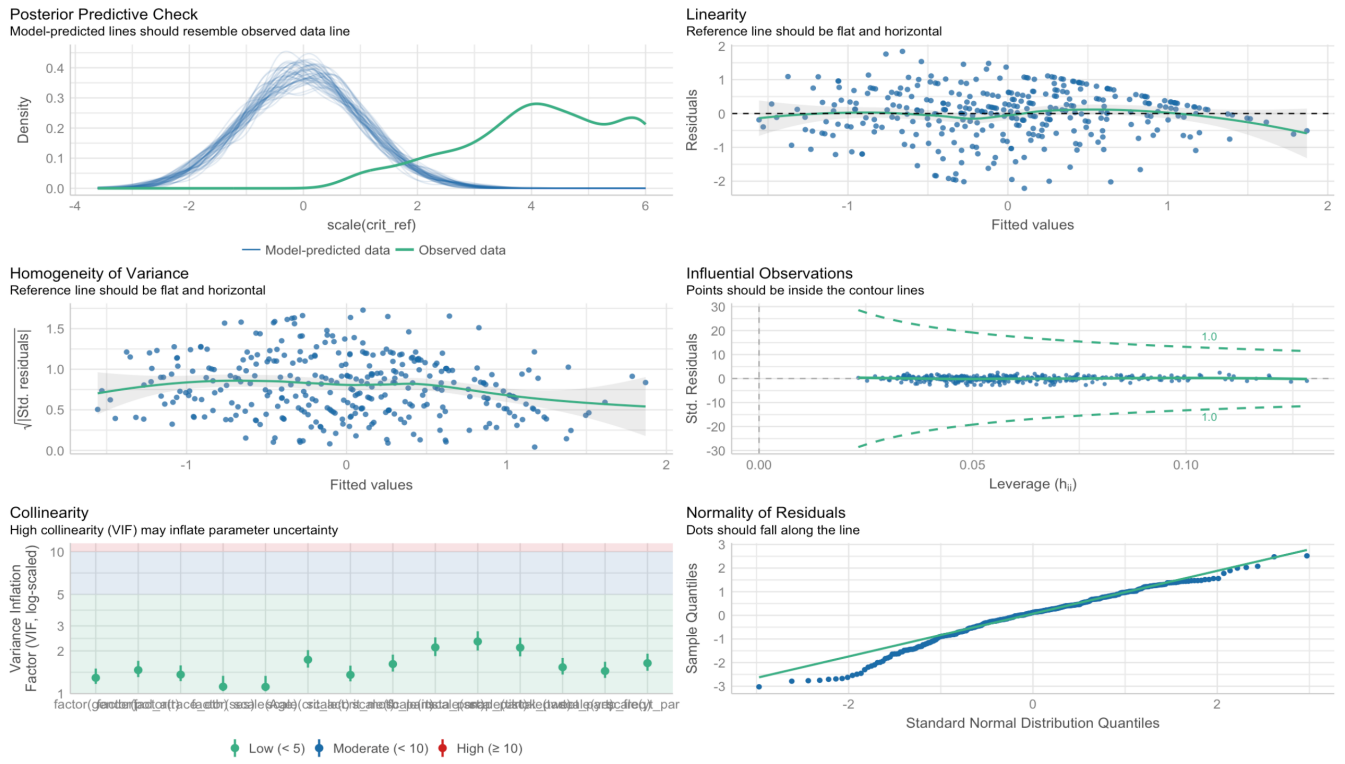


Figure C1: Multiple linear regression assumption checks for the critical reflection regression model

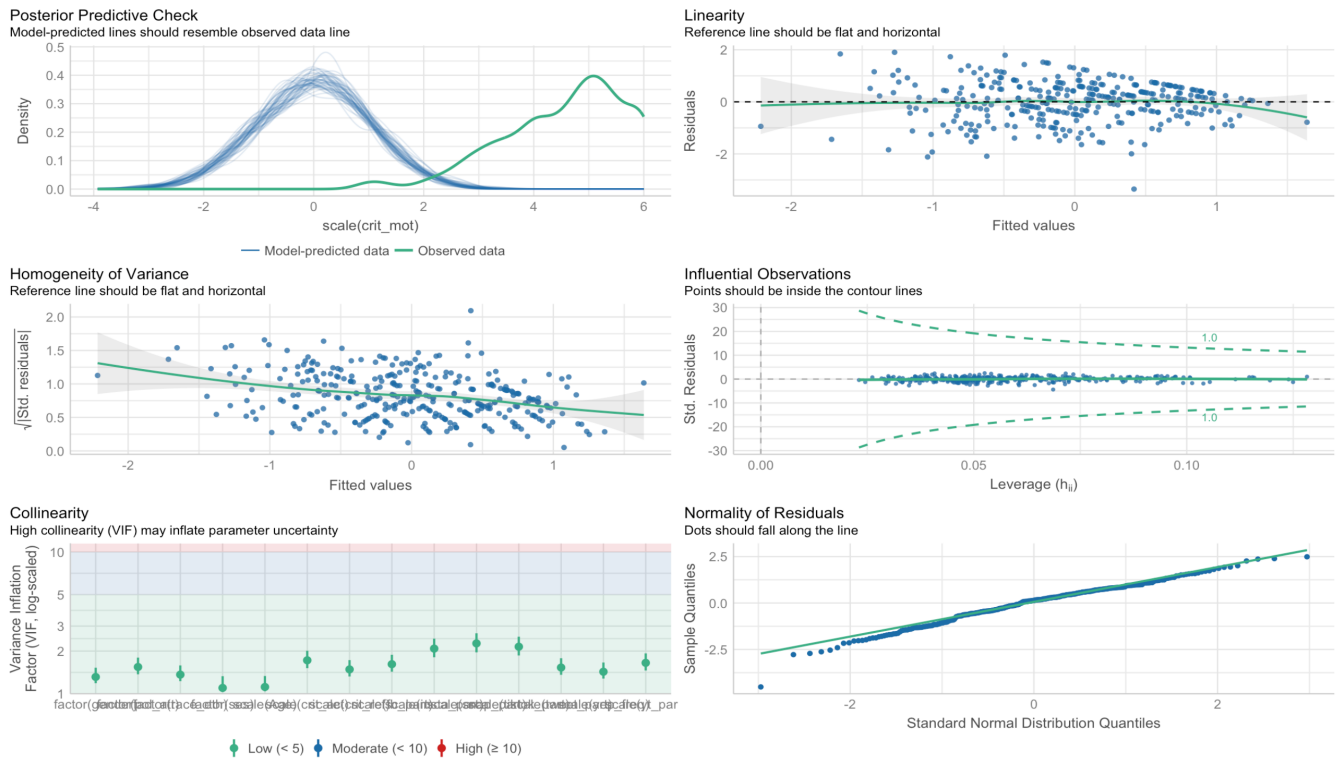


Figure C2: Multiple linear regression assumption checks for the critical motivation regression model

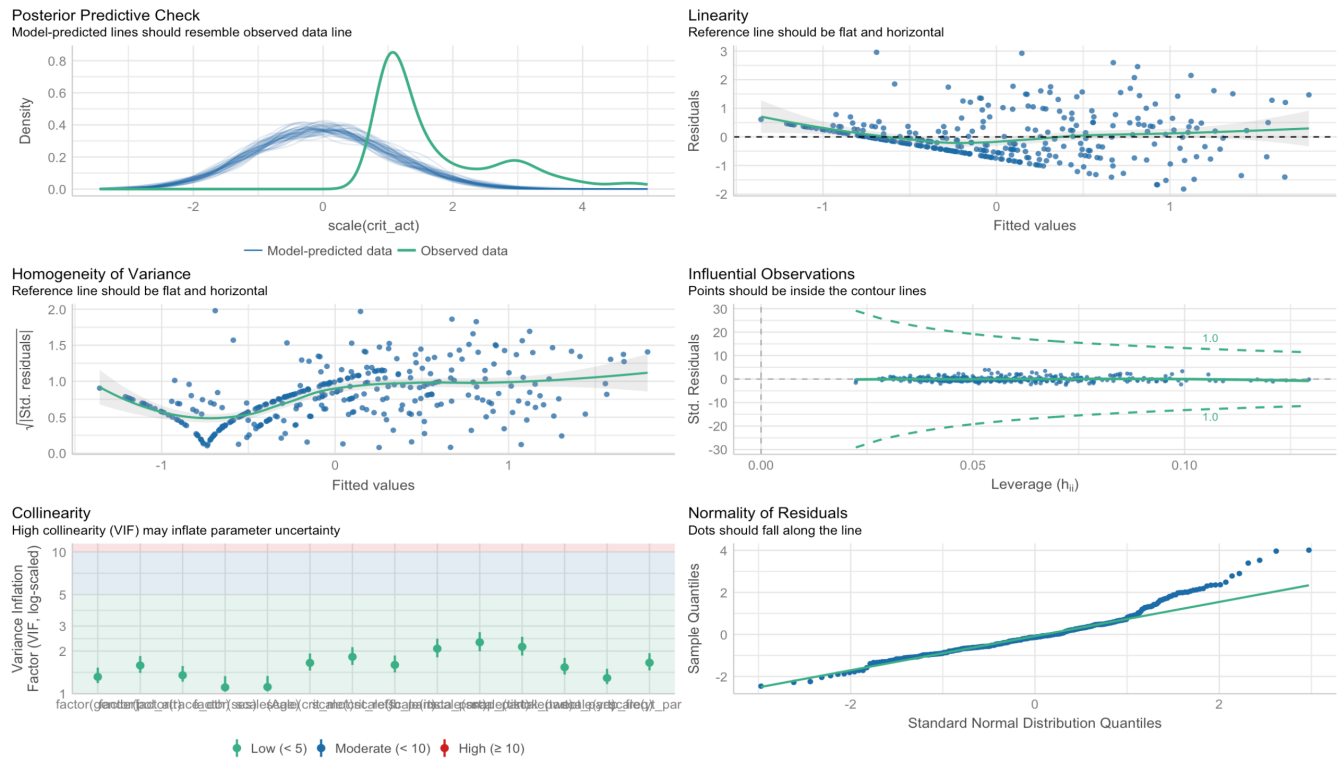


Figure C3: Multiple linear regression assumption checks for the critical action regression model

When creating the regression models, we also considered weighting our sample to better reflect the U.S. population characteristics of high-school youth to ensure that regression coefficients align closely with population estimates. Specifically, we considered weighting the demographic variables to reflect race/ethnicity, gender, and socioeconomic status based on available U.S. population data of youth. However, unweighted coefficients and standard errors can be unbiased and consistent with population estimates even when sample characteristics differ from the population. As such, unweighted coefficients can be considered reliable so long as the unweighted model is specified correctly and the coefficients do not significantly differ from the weighted coefficients [29, 133]. We followed Winship and Radbill's [133] guidelines to determine whether weighted estimates should be used, creating unweighted and weighted regression models and performing F-tests to determine if model coefficients significantly differed between the models (see also [29]). From our tests, the models did not significantly differ from one another so unweighted models were used in our findings.

After the three regression models were computed, we checked for any violations in assumptions for performing multiple regression analysis. Below, we outline the checks for these assumptions and remedies for any violations (see Figures C1, C2, and C3):

- **Linearity:** We plotted the fitted values versus residuals to examine potential violations of linearity. Violations in linearity should exhibit large deviations from the reference line, which are not exhibited across the regression models.
- **No multicollinearity:** We calculated the variable inflation factors (VIFs) to examine the presence of strong correlations among independent variables (i.e., multicollinearity). VIFs greater than 10 are generally considered the threshold for which the model exhibits multicollinearity [62]. Based on this threshold, the regression models did not exhibit multicollinearity.
- **Normality of the residuals:** We created Q-Q plots to check for normality of the residuals. We observe that the data points for some of the models deviate from the reference line, suggesting that the models may violate normality. However, researchers suggest that regression coefficients are fairly robust to violations of normality, especially those computed from large sample sizes [65, 102].
- **Homoscedasticity:** We plotted the fitted values versus the square root of the standardized residuals to examine signs of homoscedasticity in our models. Ideally, the plotted line should be horizontal and flat; however, several of the models did not exhibit this phenomenon, suggesting that the models violated homoscedasticity (i.e., heteroskedasticity). Regression coefficients from these models remain the same regardless of heteroskedasticity; however, standard error estimates are no longer accurate [58]. As such, we use robust standard errors in our calculations to compensate for heteroskedasticity [74].