THE IMPACT OF COOPERATIVE CONTACT VIA VIDEO GAMES ON BIASES AND SOCIAL EXCLUSION AMONG STUDENTS WITH DISABILITIES

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ABSTRACT

This study examined the impact of cooperative video gaming on disability-related biases and social exclusion using a treatment-only, explanatory sequential mixed methods design. Participants included two distinct groups: students studying disability services and students with disabilities. Both groups engaged in a structured cooperative video game intervention, with data collected at three time points: pretest, posttest, and follow-up. Grounded in Allport's Intergroup Contact Theory, the study investigated whether cooperative gameplay could reduce explicit and implicit biases among disability services students and improve social connectedness among students with disabilities. Quantitative measures included the Multiple Disability Multidimensional Attitudes Scale (MDMAS), Disability Attitude Implicit Association Test (DA-IAT), Contact with Disabled Persons Scale (CDP), UCLA Loneliness Scale, and the Belonging Engagement and Self-Confidence Scale (BES). Follow-up interviews explored participants' experiences and perceptions of the intervention. Results showed that cooperative video gaming reduced explicit biases in some domains but had no significant effect on implicit bias. While short-term gains were observed in belonging and engagement, these effects diminished by follow-up, and loneliness scores remained unchanged. Findings suggest that while cooperative gaming may offer a promising approach to bias reduction, sustained or more intensive interventions may be necessary to promote lasting social inclusion for students with disabilities.

Keywords: cooperative video gaming, disability-related biases, social isolation, loneliness, belonging, Intergroup Contact Theory, explicit biases, implicit biases, disability services

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CHAPTER 1: INTRODUCTION

1.1: Definitions of Key Terms and Context

Biases Towards Disabilities and Their Impact

Discrimination against individuals with disabilities remains a pervasive issue, affecting their opportunities in education, employment, and beyond; amid ongoing efforts to promote inclusivity, individuals with disabilities continue to face significant barriers, resulting in lower socioeconomic status and limited social mobility (Maroto & Pettinicchio, 2015). Employment statistics highlight these challenges starkly: while the labor force participation rate for individuals without disabilities is 66.3%, it drops dramatically to 19.3% for those with disabilities (Bureau of Labor Statistics, 2020). This disparity reveals the ongoing struggle for equal opportunities and the profound impact of societal biases. Despite legislative attempts to prohibit discriminatory practices, employers have been found to maintain negative perceptions toward individuals with disabilities (Malos, 2015). These negative perceptions contribute to harmful stereotypes and prejudice, hindering the opportunities and well-being of individuals with disabilities.

Research on stereotypes and prejudice has revealed two major kinds of bias (Devine, 1989). The first kind is explicit biases, which are conscious and reportable attitudes, beliefs, and perceptions toward a particular group. Explicit biases are deliberate and controllable, meaning individuals can choose to express or suppress these attitudes depending on the social context (Wilson & Scior, 2014). For example, a person might explicitly state that they believe individuals with disabilities are less capable, leading to discriminatory behaviors like social exclusion and reduced opportunities (Findler et al., 2007; Park et al., 2023). These biases are

typically measured through self-report surveys, allowing individuals to express their attitudes directly (Right, 2020; Findler et al., 2007).

The second kind are implicit biases, which are automatic and unconscious attitudes that influence behavior without conscious awareness. Implicit biases are more resistant to change and can persist even when individuals consciously endorse egalitarian values (Dickter et al., 2020). For instance, individuals may unconsciously exhibit less eye contact, increased physical distance, or subtle avoidance behaviors when interacting with people with disabilities (Dovidio et al., 2011). These responses contribute to a less inclusive environment and perpetuate social stigmas (Wilson & Scior, 2014). These biases are typically assessed using indirect measures such as the Implicit Association Test (IAT), which captures the strength of automatic associations between concepts (e.g., disability) and evaluations (e.g., good or bad) (Dovidio et al., 2011; Wilson & Scior, 2014). Research indicates that these biases can significantly hinder employment prospects and social inclusion for individuals with disabilities (Payne et al., 2017).

Biases towards individuals with disabilities can result in isolation and loneliness, impacting their subjective feelings of belonging, which further exacerbate the challenges they face. Social isolation is an objective state characterized by limited social connections and minimal engagement with others, leading to a lack of contact with family, friends, or the broader community (Kwan et al., 2020). This can result from physical barriers like inaccessible facilities and social barriers such as negative attitudes from peers and faculty (Bruefach & Reynolds, 2022). Loneliness, on the other hand, is a subjective emotional state resulting from a discrepancy between desired and actual social relationships, leading to feelings of emptiness or sadness (Gómez-Zúñiga et al., 2023). It is important to note that one can experience social isolation

without feeling lonely and vice versa. These issues lead to negative outcomes such as depression, anxiety, and lower life satisfaction (Gómez-Zúñiga et al., 2023; Kwan et al., 2020).

Students with disabilities often face unique challenges in academic settings that exacerbate feelings of social isolation and loneliness. The physical and social barriers in academic settings, such as inaccessible facilities and negative attitudes from peers, faculty, and other professionals can further contribute to feelings of being undervalued and marginalized, increasing feelings of loneliness (Bruefach & Reynolds, 2022). These issues are associated with lower life satisfaction, increased anxiety and depression, and decreased academic achievement (Baumeister et al., 2002; Emerson et al., 2021). For example, students with disabilities are less likely to enroll in postsecondary education compared to their non-disabled peers. In 2020, only 34% of young adults with disabilities were enrolled in postsecondary education, compared to 66% of their non-disabled peers; moreover, only 14% of students with disabilities completed a bachelor's degree or higher, compared to 37% of students without disabilities (NCES, 2023). Addressing biases that contribute to social isolation and loneliness among students with disabilities is crucial for their well-being and academic success. Therefore, interventions that promote social inclusion, belonging, and build supportive networks are essential for improving the quality of life and educational outcomes for these students.

Attitudes of Disability Services Students and Professionals

The attitudes of students and professionals in disability services play a crucial role in shaping the experiences of students with disabilities. Disability services students studying to become future disability service professionals are especially important to understand. Studies have shown that students and professionals in disability services exhibit varying levels of explicit and implicit biases. For instance, a study of over 25,000 healthcare providers revealed a

significant mismatch between their explicit and implicit attitudes, with the majority demonstrating aversive ableism, low explicit prejudice but high implicit prejudice (VanPuymbrouck et al., 2020). This discrepancy indicates that while providers may consciously believe they view individuals with disabilities positively, their unconscious biases suggest otherwise, potentially impacting their clinical interactions and decision-making processes.

Occupational and physical therapy students, as well as professionals, show similar patterns. Research indicates that while explicit attitudes towards individuals with disabilities tend to be positive, implicit biases remain strong and unchanging throughout their education and professional practice (Feldner et al., 2022). For example, occupational therapy students reported improved explicit attitudes after disability education, yet their implicit biases persisted, indicating the complexity of changing deep-seated prejudices (Feldner et al., 2022).

Rehabilitation counseling students and professionals also demonstrate significant implicit biases against individuals with disabilities. These biases can influence their professional judgments and the quality of care they provide. For instance, studies have found that despite training and awareness programs, rehabilitation counseling students continued to exhibit implicit prejudices that could affect their interactions with clients (Wong et al., 2004). This highlights the need for comprehensive training programs that address both explicit and implicit biases to improve the efficacy of disability services and promote a more inclusive environment. This need is further emphasized by the findings of a study on undergraduate rehabilitation students, which revealed the importance of addressing biases as multidimensional and the utility of contact experiences in mitigating bias (Levine et al., 2021).

Contact experiences, particularly positive and cooperative ones, are effective in moderating these biases. Rehabilitation students with more frequent and meaningful contact with

individuals with disabilities show reduced explicit and implicit biases (Kuo et al., 2022). This supports Allport's Intergroup Contact Theory, which posits that structured intergroup interactions can reduce prejudice and foster positive attitudes (Allport, 1954). Incorporating such contact experiences into disability services curricula is vital for addressing pervasive biases and enhancing outcomes for individuals with disabilities.

1.2: Theoretical Framework

Allport's Contact Theory

Allport's Intergroup Contact Theory (CT), introduced by Gordon W. Allport in his seminal work "The Nature of Prejudice" (1954), explores the conditions necessary for reducing prejudice and fostering positive relations between members of different social groups. The theory identifies critical factors for successful intergroup contact, including equal status among group members, common goals, intergroup cooperation, and sustained interactions. Allport's theory posits that effective intergroup contact can enhance understanding, empathy, and tolerance, challenging the notion that prejudice arises solely from ignorance or lack of exposure. Instead, it emphasizes the importance of the quality and context of intergroup interactions in shaping attitudes.

Effective contact occurs when individuals from different groups perceive each other as equals, a condition that helps reduce power imbalances and fosters mutual respect. In a classroom setting, for example, group projects where students with and without disabilities contribute equally can promote a sense of equal status and respect (Pettigrew & Tropp, 2006). Such settings ensure that all participants feel valued and acknowledged for their contributions, creating a balanced dynamic that discourages hierarchical perceptions.

Shared objectives further encourage cooperation and collaboration, bridging intergroup divides. When students work together towards common academic or extracurricular goals, such as completing a group assignment or participating in a sports team, they are more likely to see each other as allies rather than adversaries (Pettigrew et al., 2011). These common goals foster a sense of unity and purpose, helping to diminish preconceived notions and biases by emphasizing collective success over individual differences.

Cooperation between groups, rather than competition, promotes positive interactions and reduces hostility. Cooperative learning activities that require students to rely on each other's strengths and abilities can foster a sense of teamwork and interdependence, placing an emphasis on the value of each individual's contribution (Slavin, 1985). This cooperation encourages positive perceptions and relationships, as participants recognize the unique strengths and capabilities of their peers.

Finally, sustained contact is crucial for developing meaningful relationships and dispelling stereotypes. Regular and repeated contact, such as weekly study groups or long-term projects, allows individuals to build deeper understanding and empathy over time (Pettigrew & Tropp, 2006). This ongoing interaction is essential for breaking down initial biases and forming lasting positive attitudes, as it provides ample opportunity for individuals to move beyond superficial impressions and develop genuine connections. By meeting these conditions, structured intergroup contact can effectively reduce both explicit and implicit biases, creating a more inclusive environment for individuals with disabilities.

Recent research demonstrates the efficacy of CT in reducing stigma and bias, particularly within educational settings. Randomized experiments in college settings have revealed that intergroup contact not only fosters positive attitudes but also encourages meaningful cross-group

friendships, thereby mitigating biases and promoting social inclusion (Albuja et al., 2024). Bridges and Tomkowiak (2010) applied Allport's CT in interprofessional education, emphasizing the importance of equal status and common goals in improving student attitudes towards working in interprofessional teams. They found that structured contact among students from different healthcare disciplines improved interprofessional communication and teamwork, ultimately leading to better patient outcomes. Additionally, studies have demonstrated that structured intergroup contact, such as cooperative learning activities, significantly improves attitudes toward marginalized groups, including students with disabilities (Rademaker et al., 2020). Furthermore, CT has been validated across various contexts, showing robust results even under challenging conditions of perceived threat and discrimination (Van Assche et al., 2023). These findings highlight the potential of CT as a valuable tool for developing inclusive environments and reducing societal biases. This theoretical framework underpins the study's focus on cooperative video gaming, which aims to provide a platform for sustained, equal-status interactions with common goals and cooperation.

1.3: Overview of the Study

Purpose and Significance of the Study

This study uniquely contributes to the existing literature by integrating cooperative video gaming as a method to reduce biases and social isolation among students with disabilities. Cooperative video games provide a platform for positive intergroup interactions, which, according to CT, can reduce prejudice under conditions of equal status, common goals, intergroup cooperation, and sustained contact (Allport, 1954; Pettigrew & Tropp, 2006). Research shows that cooperative activities, including video gaming, can enhance social bonds and reduce loneliness (Depping et al., 2018; Adachi et al., 2015). By leveraging the engaging and

interactive nature of video games, this study aims to create meaningful and sustained contact between students with and without disabilities, fostering mutual understanding and reducing both explicit and implicit biases.

This study invited students with disabilities and disability services students to take part in recurring 45-minute-long cooperative gaming sessions, totaling three hours of sustained and meaningful contact. Through this innovative approach, the study sought to address the dual challenges of bias and social exclusion, providing insights into effective strategies for promoting social inclusion and well-being among students with disabilities. This research has the potential to inform educational practices and intervention programs, offering a scalable and engaging solution to a pervasive problem in academic and social contexts.

Literature Gap and Rationale for the Study

Despite extensive research on biases and social isolation faced by individuals with disabilities, there is a critical gap in strategies that address both explicit and implicit biases and social isolation simultaneously. Existing literature often focuses on either bias reduction or social integration separately. Educational interventions reduce explicit biases but often fail to address unconscious implicit biases (Wüthrich et al., 2023; Wilson & Scior, 2014). Similarly, interventions aimed at reducing social isolation frequently overlook the underlying biases that contribute to exclusion (Gómez-Zúñiga et al., 2023).

Explicit biases, which are conscious and deliberate, can be mitigated through educational programs and awareness campaigns (Findler et al., 2007). However, implicit biases, which are automatic and unconscious, require more sustained and immersive approaches (Dickter et al., 2020). Addressing social isolation among students with disabilities requires multifaceted

strategies that promote meaningful social interactions and build supportive networks (Emerson et al., 2021).

Cooperative video gaming presents a novel intervention method to fill this gap. Video games that require cooperation and teamwork offer an engaging platform for fostering positive intergroup contact. According to Allport's Contact Theory, sustained and meaningful interactions between different social groups can significantly reduce prejudice (Allport, 1954; Pettigrew & Tropp, 2006). Cooperative video gaming facilitates such interactions and provides an environment where players work towards common goals, reducing both explicit and implicit biases.

Research supports the potential of cooperative video gaming to enhance social bonds, improve feelings of belonging, and reduce loneliness (Adachi et al., 2015; Depping et al., 2018). Video games create immersive experiences that encourage repeated and meaningful contact, which is crucial for changing explicit and implicit attitudes, and reducing social isolation (Pettigrew, 1998; Paluck & Green, 2009). The interactive nature of video games can engage participants in ways that traditional educational programs may not, enhancing the intervention's effectiveness and sustainability.

In summary, this study aims to explore the effectiveness of cooperative video gaming as an integrated intervention to reduce both explicit and implicit biases and social isolation among students with disabilities. By leveraging the interactive nature of video games, this study seeks to provide a scalable and innovative solution to these challenges, contributing valuable insights to the fields of education, psychology, and disability studies.

Research Questions and Methodology

This study is guided by four primary research questions:

1. What are the disability-related biases of disability services students?
    a. What are the explicit disability-related biases of disability services students?
    b. What are the implicit disability-related biases of disability services students?
    c. Do demographic features like years of age, gender, race/ethnicity affect the disability-related biases of disability services students?
    d. Does the amount of prior contact with individuals with disabilities affect the disability-related biases of disability services students?
2. Does a cooperative video game play experience have an effect on the disability-related biases of disability services students?
    a. Does a cooperative video game play experience have an effect on the explicit disability-related biases of disability services students?
    b. Does a cooperative video game play experience have an effect on the implicit disability-related biases of disability services students?
    c. Does the effect of a cooperative video game play experience on disability-related biases vary based on the amount of prior contact with individuals with disabilities?
    d. Does a cooperative video game play experience have an effect on the disability-related biases of disability services students while controlling for covariates such a demographic features?
3. What are the levels of social isolation among students with disabilities?
    a. What are the subjective feelings of loneliness among students with disabilities?
    b. What are the subjective feelings of belonging among students with disabilities?

4. Does a cooperative video game play experience have an effect on the subjective feelings of students with disabilities?
    a. Does a cooperative video game play experience have an effect on the subjective feelings of loneliness among students with disabilities?
    b. Does a cooperative video game play experience have an effect on the subjective feelings of belonging among students with disabilities?

To address these questions, the study employs an explanatory sequential mixed methods design. This approach involves collecting and analyzing quantitative data first, followed by qualitative inquiry to complement the quantitative results (Creswell & Plano Clark, 2017). This design provides a comprehensive understanding of the impact of cooperative video gaming on biases and social isolation.

In the quantitative phase, data will be collected using a number of validated instruments. Explicit biases will be assessed using the Multiple Disability Multidimensional Attitudes Scale (MDMAS; Park et al., 2023), while implicit biases will be measured using the Disability Attitude Implicit Association Test (DA-IAT; Pruett & Chan, 2006). The Contact with Disabled Persons Scale (CDP; Yuker & Hurley, 1987) will gauge participants' prior contact experience with individuals with disabilities, and the UCLA Loneliness Scale (Version 3; Russell, 1996) will measure feelings of loneliness. Additionally, the Belonging, Engagement, and Self-confidence scale (BES) (Yorke, 2016) will assess students' sense of belonging to their institution, their level of academic engagement, and their self-confidence in higher education to evaluate their levels of social isolation. These measures will be administered at three time points: pretest, post-intervention, and follow-up.

Following the quantitative phase, semi-structured interviews will be conducted with a subset of participants. These interviews aim to provide deeper insights into the participants' experiences and perceptions of the cooperative gaming intervention. The qualitative data will help explain the mechanisms underlying the observed changes in biases and social isolation.

The integration of quantitative and qualitative data will occur during the interpretation phase, where qualitative findings will elaborate on and contextualize the quantitative results. This mixed methods approach captures the complex nature of biases and social isolation, providing a holistic view of how cooperative video gaming can influence these outcomes (Teddlie & Tashakkori, 2009).

Overall, this methodological framework allows for a robust examination of the research questions. It ensures that the study not only quantifies changes in attitudes and social isolation but also explores the underlying processes contributing to these changes. By employing an explanatory sequential mixed methods design, this study aims to generate comprehensive insights into the effectiveness of cooperative video gaming as an intervention for reducing biases and social isolation among students with disabilities.

1.4: Thesis Statement

This study investigates how cooperative video gaming can impact explicit and implicit biases among students without disabilities, and the feeling of loneliness and belonging among students with disabilities. By applying CT through structured intergroup interactions in a cooperative gaming environment, this research aims to foster positive attitudes and inclusive behaviors between students with and without disabilities. The anticipated contributions of this study include providing evidence for the effectiveness of cooperative video gaming as a scalable

and engaging intervention for bias reduction and social inclusion, offering valuable insights for educational practices and policymaking in higher education settings.

CHAPTER 2: LITERATURE REVIEW

2.1: Explicit and Implicit Biases Toward Individuals with Disabilities

Manifestation of Biases Toward Individuals with Disabilities

Biases toward individuals with disabilities manifest in various forms, both explicit and implicit, influencing social interactions, opportunities, and overall well-being. Explicit biases are conscious attitudes and beliefs that individuals hold about people with disabilities, often leading to overt discrimination. For example, Findler and colleagues (2007) explored the multidimensional attitudes toward persons with disabilities, revealing that explicit negative attitudes are prevalent and can significantly affect the social inclusion of individuals with disabilities. Their study demonstrated that people often hold explicit biases against those with disabilities, perceiving them as less competent and more dependent, which in turn influences their willingness to engage in social or professional relationships with them.

Implicit biases, on the other hand, are unconscious attitudes that can subtly influence behavior and decision-making without individuals being aware of their prejudices. Dovidio and colleagues (2011) examined implicit attitudes and discrimination against people with physical disabilities, finding that implicit biases often lead to subtle forms of discrimination, such as nonverbal cues or microaggressions, which can significantly impact the experiences of individuals with disabilities. Their research highlighted that even well-meaning individuals could exhibit biased behaviors unconsciously, contributing to a less inclusive environment.

Dickter et al. (2020) investigated both implicit and explicit attitudes toward autistic adults, using an implicit association test (IAT) to assess underlying biases. Their findings revealed that while participants often reported positive explicit attitudes, their implicit attitudes were significantly more negative. This discrepancy between explicit and implicit attitudes

suggests that people may consciously endorse inclusive values while unconsciously harboring negative biases, which can lead to behavioral rejection and social exclusion of autistic individuals. The study also found that individuals with more autistic traits themselves exhibited less implicit bias, indicating that personal experiences and familiarity with autism can reduce unconscious prejudices.

Wilson and Scior (2014) conducted a comprehensive review of attitudes towards individuals with disabilities as measured by the IAT. They found consistent evidence of implicit biases across various disability types, including mental illness and physical disabilities. These biases were often stronger than explicit biases and were linked to less favorable behavioral intentions and actual discriminatory behaviors. For instance, individuals with higher implicit biases were less likely to hire or recommend individuals with disabilities for job positions, highlighting the significant impact of implicit attitudes on practical decision-making. Furthermore, research indicates that implicit biases among healthcare providers can lead to disparities in diagnosis, treatment, and overall care quality (Maina et al., 2018). For instance, implicit biases may result in clinicians underdiagnosing or misdiagnosing conditions such as ASD and ADHD, especially in racially and ethnically diverse populations. This can exacerbate health disparities and contribute to poorer health outcomes for these individuals (Kuhlthau et al., 2018; Maina et al., 2018).

Park and colleagues (2023) examined the attitudes of college students toward peers with disabilities and found that both explicit and implicit biases were prevalent. Their study showed that students with disabilities were often perceived as less capable and more burdensome, which led to their exclusion from group activities and social networks. The researchers emphasized that

these biases contribute to the social isolation and marginalization of students with disabilities, underscoring the need for comprehensive interventions that address both types of biases.

Wüthrich et al. (2023) explored attitudes toward disabilities across different cultural contexts, revealing significant variations in how biases manifest. In some cultures, disabilities are associated with stigma and shame, leading to severe social exclusion and discrimination. For instance, their study found that in certain cultural settings, individuals with disabilities were often hidden from public view and denied opportunities for education and employment. This cultural variation highlights the importance of developing context-specific strategies to combat biases and promote inclusivity.

Specific examples from these studies illustrate the real-world impact of biases on individuals with disabilities. For instance, Dovidio et al. (2011) described a case where a physically disabled employee received fewer opportunities for career advancement compared to their non-disabled peers, despite having similar qualifications and performance. This was attributed to the implicit biases held by the management, who unconsciously perceived the disabled employee as less competent. Similarly, Park et al. (2023) provided an example of a college student with a learning disability who was consistently excluded from study groups and collaborative projects. The exclusion was not due to a lack of willingness to participate but rather the implicit biases of peers who assumed the student would contribute less effectively.

These studies collectively demonstrate that biases toward individuals with disabilities are pervasive and multifaceted, manifesting both explicitly and implicitly. Addressing these biases requires comprehensive interventions that target both conscious and unconscious attitudes, fostering a more inclusive and supportive environment for individuals with disabilities.

Tools and Methods Used to Measure Explicit Biases

Explicit biases are measured using self-report surveys and questionnaires. The Multidimensional Attitudes Scale Toward Persons with Disabilities (MAS) is widely used to assess three dimensions: affect (emotional responses), cognition (beliefs and thoughts), and behavior (intended actions). Participants respond to vignettes describing interactions with individuals with disabilities and rate their attitudes on a Likert-type scale. The MAS has demonstrated strong reliability and validity, making it a robust tool for assessing explicit biases (Findler et al., 2007).

Another common tool is the adapted version of the Chedoke–McMaster Attitudes Towards Children with Handicaps (CATCH) scale, used to measure explicit attitudes in educational settings. This scale evaluates students' self-reported attitudes toward peers with disabilities through a series of statements rated on a Likert scale, effectively capturing changes in explicit attitudes following interventions (Wüthrich et al., 2023).

Tools and Methods Used to Measure Implicit Biases

Implicit biases are assessed using indirect measures that capture automatic associations. The IAT is one of the most widely used tools, assessing the strength of automatic associations between target groups (e.g., individuals with disabilities) and evaluative attributes (e.g., good or bad) by measuring response times in categorization tasks (Dovidio et al., 2011; Wilson & Scior, 2014). Participants are typically faster at categorizing congruent pairs (e.g., abled-bodied and good) than incongruent pairs (e.g., disabled-bodied and good), indicating implicit biases. The IAT has been extensively validated and is considered a reliable measure of implicit attitudes (Wilson & Scior, 2014). Additionally, the Disability Attitude Implicit Association Test (DA-IAT) is specifically tailored to assess implicit attitudes toward individuals with disabilities. It

follows a similar format to the general IAT but focuses on disability-related stimuli, uncovering implicit biases that might not be apparent through self-report measures (Pruett & Chan, 2006).

Huang et al. (2023) further elaborate on the methods used to measure implicit biases, noting that while the IAT is the predominant tool, other measures such as priming tasks, inhibition tasks, and various rating scales are also employed. These methods are designed to capture the subtle, often unconscious attitudes that individuals may hold towards people with disabilities. Priming tasks, for example, assess how exposure to disability-related words influences subsequent evaluations, while inhibition tasks measure the difficulty of suppressing biased responses. The IAT's reliability is supported by its ability to detect implicit biases across various domains, including disability. However, it is not without limitations. Critics argue that the IAT's reliance on response latency may be influenced by factors unrelated to implicit bias, such as cognitive and motor skills (Huang et al., 2023). Despite these criticisms, the IAT remains a valuable tool for uncovering implicit biases that traditional self-report measures may miss.

Integration of Measurement Tools

Combining explicit measures like the MAS and CATCH scale with implicit measures like the DA-IAT provides a comprehensive assessment of biases toward individuals with disabilities. Explicit measures capture self-reported attitudes and beliefs, while implicit measures uncover automatic unconscious biases that may influence behavior (Dovidio et al., 2011; Wilson & Scior, 2014). This integration offers a holistic view of attitudes, essential for developing effective interventions to reduce bias and promote inclusivity (Findler et al., 2007; Pruett & Chan, 2006; Park et al., 2023).

Prevalence of Biases Towards Individuals with Disabilities

Research consistently demonstrates the prevalence of both explicit and implicit biases toward individuals with disabilities across various populations. While many individuals report positive explicit attitudes, significant levels of negative attitudes and stereotypes persist, particularly among those with less direct contact or experience with disabled individuals (Wilson & Scior, 2014).

Implicit biases are even more pervasive and persistent. Studies using the IAT have found moderate to strong negative implicit attitudes toward individuals with physical disabilities (Dovidio et al., 2011). Similarly, significant implicit biases against autistic adults exist despite participants expressing positive explicit attitudes (Dickter et al., 2020). These findings reveal the persistent nature of implicit biases, which can exist even when individuals consciously endorse egalitarian values.

The literature also reveals variability in implicit biases based on specific types of disabilities. For instance, attitudes toward different disabilities such as anxiety disorder, autism spectrum disorder (ASD), blindness, and schizophrenia differ in intensity and nature, suggesting the need for targeted interventions to address the unique biases associated with each disability type (Park et al., 2023). Understanding these differences is crucial for developing effective strategies to reduce implicit biases.

Building on the understanding of variability in biases, Thompson (2020) found no significant correlation between implicit and explicit bias measures among college students, consistent with prior research. Interestingly, the study revealed that the year in school was a significant predictor of implicit attitudes, with students in higher years showing more positive implicit attitudes towards individuals with IDD. This suggests that prolonged exposure to higher

education may contribute to reducing implicit biases (Thompson, 2020). However, explicit attitudes did not show significant variation based on these factors, indicating that implicit and explicit biases may be influenced by different factors and require distinct intervention strategies. Therefore, it is essential to consider both types of biases when designing interventions.

Impact of Biases on Individuals with Disabilities

The impact of both explicit and implicit biases on individuals with disabilities is profound, affecting various aspects of their lives. Explicit biases lead to overt discrimination, social exclusion, and reduced opportunities in education, employment, and social interactions (Findler et al., 2007). Implicit biases, although less visible, can have equally detrimental effects. These automatic biases influence nonverbal behaviors and decision-making processes, resulting in subtle forms of discrimination that are harder to identify and address. Implicit biases can result in microaggressions such as reduced eye contact, increased physical distance, and patronizing attitudes, contributing to a hostile and exclusionary environment (Dovidio et al., 2011).

Biases also impact mental health and well-being. Negative attitudes and stereotypes contribute to increased stress, anxiety, and depression among individuals with disabilities, leading to lower self-esteem and self-worth (Wüthrich et al., 2023). The internalization of these negative attitudes exacerbates the challenges faced by individuals with disabilities. Dickter et al. (2020) highlighted that autistic adults often encounter implicit biases that affect their social interactions and opportunities, reinforcing feelings of isolation and stigmatization.

Overall, the prevalence and impact of explicit and implicit biases toward individuals with disabilities highlight the need for comprehensive strategies to address these issues. Interventions should focus on changing explicit attitudes through education and awareness programs and reducing implicit biases through sustained positive contact and inclusive practices (Wilson &

Scior, 2014; Park et al., 2023). Addressing both types of biases is crucial for creating a more inclusive and equitable society. Such biases not only lead to discriminatory behaviors but also contribute significantly to social isolation and loneliness among individuals with disabilities.

2.2: Social Isolation and Loneliness Among Students with Disabilities

Challenges Faced by Students with Disabilities in Academic Settings

Students with disabilities often face significant physical and environmental barriers. The inaccessibility of campus facilities, classrooms, and social spaces can prevent these students from fully participating in academic and social activities. Such barriers lead to exclusion from informal social interactions and collaborative learning opportunities, crucial for academic success and social integration (Gómez-Zúñiga et al., 2023). In addition to physical barriers, social stigma and discrimination are pervasive challenges. Negative attitudes and stereotypes from peers and faculty contribute to feelings of being undervalued and marginalized, leading to social exclusion and increased feelings of loneliness (Tarvainen, 2021). This social stigma often results in exclusion from social networks and group activities, impacting one's sense of belonging.

Tarvainen (2021) explored the narratives of students with disabilities and found that many of them experience profound loneliness due to their perceived differences and exclusion from peer groups. For example, a student with a physical disability described feeling isolated because they were unable to participate in social activities that required physical mobility, such as sports or club events. Another student with a learning disability shared their experience of being excluded from study groups because peers assumed they would slow down the group's progress. This exclusion not only affected the student's academic performance but also their self-esteem and sense of belonging. Further studies have shown that individuals with ASD often face

higher levels of social isolation, which negatively impacts their mental health and overall quality of life (Tanner et al., 2015). Adequate social support is crucial for the well-being of students with disabilities, yet these students often report having fewer friends and less social support compared to their non-disabled peers. The absence of a supportive social network can exacerbate feelings of loneliness and negatively impact feelings of belonging, mental health, and academic performance (Emerson et al., 2021).

Integrating into the academic and social fabric of the university can be particularly challenging for students with disabilities. They may face difficulties forming meaningful relationships with peers, participating in extracurricular activities, and accessing academic support services. These barriers hinder both academic success and social inclusion, making it harder for these students to feel part of the campus community (Bruefach & Reynolds, 2022). Recent statistics show that students with ASD are less likely to graduate from high school and pursue higher education compared to their non-disabled peers. Similarly, students with ADHD often struggle with attention and hyperactivity, leading to academic difficulties and lower educational attainment (Hebert & McReynolds, 2023). Mental health issues intersect with disability, compounding the challenges of social isolation and loneliness. Students with disabilities who experience anxiety, depression, or other mental health difficulties are particularly vulnerable to social withdrawal and academic disengagement (Kwan et al., 2020). Economic and financial barriers further restrict opportunities for social participation and access to educational resources. The higher costs associated with disability accommodations and healthcare create additional financial strain, limiting involvement in campus life and exacerbating feelings of isolation (Saran et al., 2023).

Impact of Social Isolation and Loneliness on Well-Being and Academic Performance

Social isolation and loneliness significantly affect the well-being and academic performance of students with disabilities. Loneliness and social isolation are associated with lower life satisfaction, increased anxiety and depression, and decreased academic achievement (Baumeister et al., 2002; Emerson et al., 2021). These experiences can create a negative feedback loop, where academic and social difficulties reinforce each other, making it harder for students to succeed and feel a sense of belonging in the academic community.

Social isolation and loneliness are linked to mental health issues such as depression, anxiety, and emotional distress (Tarvainen, 2021). Prolonged loneliness often leads to significant emotional distress and a sense of hopelessness. Students with disabilities who experience these conditions are more likely to suffer from these psychological disorders, creating a vicious cycle that is difficult to break. Feelings of social isolation and loneliness negatively impact self-worth and personal efficacy. Students with learning disabilities who experience social isolation often struggle with lower self-esteem and self-efficacy, hindering their willingness to engage in academic activities and participate in classroom discussions, which are critical for academic success (Bruefach & Reynolds, 2022).

Academic performance is adversely affected by social isolation and loneliness. Students who feel isolated are less likely to participate in collaborative learning activities essential for academic development. Social exclusion impairs cognitive processes, reducing the ability to engage in complex problem-solving and logical reasoning tasks, directly impacting academic performance (Baumeister et al., 2002). The lack of social support and positive peer interactions diminishes academic motivation. Without a supportive network, students with disabilities may find it challenging to stay motivated and engaged with their studies. Social support is crucial for

academic success as it provides emotional encouragement and practical assistance, such as study help and resource sharing (Saran et al., 2023).

Overview of Interventions Aimed at Reducing Isolation and Loneliness

Numerous interventions have been developed to reduce social isolation and loneliness among students with disabilities. These interventions vary in approach, targeting different aspects of social integration, mental health, and community involvement.

One common intervention strategy is the implementation of social skills training programs. Social skills training programs aim to enhance the interpersonal skills of students with disabilities, enabling them to navigate social interactions more effectively. These programs often include activities that teach communication, empathy, and conflict resolution. By improving these skills, students are better equipped to form and maintain meaningful relationships, thereby reducing feelings of loneliness and isolation (Saran et al., 2023).

Another effective intervention involves creating inclusive educational environments. Schools and universities can foster inclusion by ensuring physical accessibility, promoting disability awareness, and implementing policies that encourage the participation of students with disabilities in all aspects of academic and social life. Accessible facilities, adaptive technologies, and inclusive teaching practices help integrate students with disabilities into mainstream classrooms, reducing their sense of isolation (Gómez-Zúñiga et al., 2023).

Peer support programs are also instrumental in mitigating social isolation. These programs pair students with disabilities with peers who provide emotional support, academic assistance, and companionship. Such initiatives not only help students with disabilities feel more connected but also educate their peers about disabilities, fostering a more inclusive and empathetic school culture (Kwan et al., 2020). Mentorship programs, where older students or

adults with disabilities mentor younger students, provide valuable role models and guidance, further enhancing social inclusion.

Mental health support services play a critical role in addressing the emotional aspects of loneliness and isolation. Counseling and therapy services tailored to the needs of students with disabilities help them cope with the psychological impacts of social isolation and develop strategies to build social connections. Group therapy sessions, in particular, offer a supportive environment where students can share experiences and build relationships with others facing similar challenges (Emerson et al., 2021).

Addressing social isolation and loneliness among students with disabilities requires a multifaceted approach. Interventions should include social skills training, inclusive educational practices, peer support programs, and mental health services. By implementing these strategies, educational institutions can create more supportive and inclusive environments that enhance the well-being and academic success of students with disabilities. The significant negative impacts of social isolation and loneliness on well-being and academic performance underscore the urgent need for targeted interventions. Addressing these issues is critical for improving the quality of life and educational outcomes for students with disabilities, highlighting the necessity of reducing disability-related biases and addressing feelings of isolation.

2.3: Importance of Addressing Bias and Social Isolation

The profound impact of explicit and implicit biases compounded with social isolation and loneliness make it imperative to understand the broader importance of addressing these issues. Reducing disability-related biases and addressing social isolation are critical for improving the well-being and social integration of individuals with disabilities. Biases and social isolation significantly impact mental health, academic performance, and overall quality of life.

Hatzenbuehler and colleagues (2013) argue that stigma acts as a fundamental cause of health inequalities, affecting multiple health outcomes through various pathways such as stress, social isolation, and reduced access to resources. This stigma, coupled with societal biases, perpetuates a cycle of exclusion and marginalization, leading to poorer health outcomes for individuals with disabilities.

Social isolation and loneliness exacerbate these negative outcomes. Tarvainen (2021) found that individuals with disabilities often face profound loneliness due to social and environmental barriers, which in turn affects their mental health and social well-being. Furthermore, Bruefach and Reynolds (2022) found that students with learning disabilities who experience social isolation struggle with lower self-esteem and academic performance. The emotional toll of loneliness and the lack of social support systems further hinder their ability to succeed academically and socially.

Addressing these biases and feelings of isolation requires comprehensive interventions. Juvonen et al. (2019) emphasize the need for proactive educational practices that foster inclusive environments and promote positive intergroup interactions. Schools and universities play a crucial role in creating supportive settings where students with disabilities can thrive. Similarly, Derbyshire et al. (2023) highlight the importance of increasing disability representation in workplaces to combat implicit biases. Greater representation can help shift perceptions and reduce prejudice, leading to more inclusive and supportive environments.

What Is Not Working About Prior Attempts to Reduce Bias?

Reducing disability-related biases and mitigating feelings of isolation are crucial steps toward creating a more inclusive society. The Americans with Disabilities Act (ADA) has been instrumental in advancing the rights and inclusion of individuals with disabilities by providing

legal protections against discrimination and mandating accessibility in various spheres of life. However, while the ADA represents significant progress, research indicates that additional complementary approaches are needed to fully address and reduce biases.

Stein and Stein (2006) commend the ADA for its pivotal role in promoting the civil rights of individuals with disabilities but also point out that the focus on legal protections does not always translate into social acceptance and inclusion. They argue that while the ADA addresses explicit forms of discrimination, it falls short in tackling implicit biases and socio-cultural factors that contribute to stigma and isolation. This limitation suggests that although the ADA effectively combats overt discrimination, deeper, ingrained biases remain unaddressed.

Vuk (2022) underscores the deep-rooted socio-cultural biases that hinder the inclusion of individuals with disabilities. They argue that historical stigma and societal attitudes frame people with disabilities as vulnerable and dependent, preventing genuine interpersonal connections and friendships. These biases are not easily addressed through legislation alone, as they are ingrained in social norms and cultural perceptions. Hatzenbuehler et al. (2013) advocate for a more holistic approach that incorporates a human rights perspective, integrating civil, political, economic, social, and cultural rights. They emphasize that while the ADA has made significant strides in reducing explicit discrimination, a broader strategy that includes public education, community engagement, and mental health support is essential for fostering genuine inclusion and reducing implicit biases.

In conclusion, while legislative efforts have made strides in reducing overt discrimination, it remains important to address the underlying biases and structural issues that contribute to social isolation and exclusion. A shift towards a holistic framework, combined with proactive educational and workplace practices, is essential for fostering true inclusion and

reducing bias against individuals with disabilities. Targeted interventions that promote direct and positive interactions between individuals with and without disabilities can be effective. A theoretical framework, such as CT, offers a promising solution to these challenges by providing a structured approach to fostering positive intergroup interactions and reducing prejudice. By integrating legal protections with social and educational interventions, society can move closer to achieving true inclusion and equity for all individuals.

2.4: Theoretical Framework

Allport's Contact Theory

Allport's Contact Theory (CT), initially proposed in the mid-20th century, provides a theoretical basis for understanding how structured intergroup contact can reduce prejudice and improve intergroup relations (Allport, 1954). This framework is essential for developing effective interventions to address the biases and isolation faced by individuals with disabilities. Allport's CT outlines several key conditions essential for promoting positive intergroup interactions and reducing prejudice:

1. Equal Status: Members perceive themselves as equals in terms of social status, power, and worth, fostering mutual respect and diminishing feelings of superiority or inferiority (Allport, 1954).
2. Common Goals: Cooperation and collaboration towards shared objectives help transcend intergroup boundaries and foster a shared sense of purpose (Pettigrew et al., 2011).
3. Intergroup Cooperation: Collaborative efforts toward achieving common goals emphasize teamwork and mutual interdependence (Slavin, 1985).

4. Sustained Contact: Ongoing interactions facilitate the development of meaningful relationships, dispelling stereotypes and promoting empathy and understanding over time (Pettigrew & Tropp, 2006).

Meta-analytic studies support the effectiveness of intergroup contact in reducing prejudice across various contexts. Pettigrew and Tropp (2006) revealed that meaningful interactions between members of different social groups are consistently associated with decreased levels of prejudice and increased positive attitudes towards outgroups. Hewstone and Swart (2011) provide a comprehensive review of the evolution of intergroup contact research, tracing its development from a hypothesis to an integrated theory. They explore how contemporary research has expanded beyond traditional notions of intergroup contact to incorporate factors like identity complexity, intergroup anxiety, and extended contact effects.

How Contact Theory Has Been Used to Address Biases Towards Individuals with Disabilities

In educational settings, structured and meaningful contact between students with and without disabilities significantly fosters positive attitudes and supports inclusive education. McKay (2018) demonstrated that in adapted physical education settings, promoting conditions such as equal status, common goals, and cooperation helps break down stereotypes and build mutual respect. Consiglio and colleagues (2015) found that direct contact experiences with disabled peers significantly improved social attitudes among school children, demonstrating the effectiveness of CT in reducing biases in educational environments.

In workplace contexts, structured interactions and supportive environments can reduce biases and promote inclusivity. Harpur (2014) examined the experiences of professionals with disabilities and found that proactive behaviors such as demystifying their disabilities and demonstrating their capabilities help reduce biases and improve perceptions among colleagues.

These strategies align with CT's principles of structured interactions and supportive environments, emphasizing its applicability in professional settings.

In broader social settings, both direct and indirect contact can reduce prejudice. Paluck and Green (2009) highlighted the potential of media interventions to reduce prejudice, noting that narratives and storytelling can effectively change attitudes by humanizing outgroup members and fostering empathy. Binder et al. (2009) conducted a longitudinal study across three European countries and found that extended contact, where individuals learn that a member of their ingroup has a close relationship with an outgroup member, can significantly reduce prejudice.

Engle and Crowne (2014) explored the impact of international experiences on cultural intelligence using Allport's CT, finding that structured short-term international experiences significantly increased cultural intelligence among university students by promoting equal status interactions, common goals, and cooperation. This application of CT in a global educational context demonstrates its versatility in reducing biases and improving intergroup relations by aligning with Allport's conditions for effective intergroup contact.

Analysis of the Role of Positive Intergroup Contact in Alleviating Feelings of Isolation

Positive intergroup contact has been shown to be a powerful intervention for alleviating feelings of social isolation among students with disabilities. Intergroup CT posits that interactions between members of different social groups can reduce prejudice and improve attitudes toward outgroup members, thereby enhancing social inclusion (Baumeister et al., 2002). When applied in educational settings, positive intergroup contact can significantly improve the social experiences of students with disabilities.

Structured opportunities for intergroup contact, such as cooperative learning activities, inclusive sports teams, and social clubs, can facilitate meaningful interactions between students with and without disabilities. These interactions help to break down stereotypes and build mutual understanding and respect. For example, cooperative learning activities that require students to work together towards a common goal can promote positive intergroup relationships and reduce social barriers (Saran et al., 2023). By engaging in shared tasks, students learn to appreciate each other's strengths and abilities, fostering a more inclusive environment.

Additionally, positive intergroup contact can also occur through extracurricular activities. Inclusive sports teams and social clubs provide informal settings where students with disabilities can interact with their peers on equal terms. These activities not only enhance social skills but also create opportunities for friendships and social networks to develop (Gómez-Zúñiga et al., 2023). Participation in such groups can significantly reduce feelings of loneliness and isolation by providing a sense of belonging and community.

Relevance of This Theory to the Study's Focus

Allport's CT is highly relevant to addressing both explicit and implicit biases towards individuals with disabilities as well as alleviating social isolation and loneliness. Explicit biases are conscious, deliberate attitudes and beliefs, while implicit biases are unconscious associations that can influence behavior and decision-making. Both types of biases can significantly impact the inclusion and well-being of individuals with disabilities.

McKay (2018) and Consiglio et al. (2015) provide empirical support for the effectiveness of CT in reducing explicit biases. Their studies in educational settings show that structured, meaningful interactions between students with and without disabilities can lead to significant improvements in attitudes and perceptions. These findings underscore the importance of creating

conditions that facilitate positive intergroup contact to reduce overt prejudice and promote inclusivity.

Implicit biases, although less visible, can be equally damaging. They often manifest in subtle forms of discrimination and exclusion. Binder et al. (2009) support the idea that sustained positive contact can reduce both explicit and implicit biases. Their study found that meaningful intergroup contact over time could significantly decrease negative attitudes and promote social integration, highlighting the comprehensive impact of CT on intergroup relations.

The mechanisms through which CT influences implicit biases are multifaceted. One significant process facilitated by CT is empathy and perspective-taking. When individuals engage in cooperative activities that require understanding and empathy, they are more likely to see members of outgroups as individuals rather than stereotypes. This cognitive shift helps reduce automatic, biased responses. Research by Turner and colleagues (2007) found that increased empathy resulting from intergroup contact was associated with lower levels of implicit prejudice.

Additionally, positive intergroup contact can normalize interactions with outgroup members and reduce anxiety related to such interactions. Page-Gould et al. (2008) showed that positive contact experiences reduce intergroup anxiety, which in turn lowers implicit biases. When individuals frequently interact with people with disabilities in positive settings, their anxiety decreases, and they become more comfortable and accepting. This reduced anxiety can help diminish implicit biases over time.

Furthermore, CT is crucial in addressing social isolation and loneliness among individuals with disabilities. The principles of equal status, common goals, intergroup cooperation, and sustained contact not only reduce biases but also foster a sense of belonging and

community. Positive intergroup contact can lead to the development of meaningful relationships and support networks, which are essential in alleviating feelings of loneliness and social isolation (Harpur, 2014).

The effectiveness of intergroup contact in reducing social isolation is supported by numerous studies. For instance, Emerson et al. (2021) found that students with disabilities who participated in inclusive extracurricular activities reported lower levels of loneliness and higher levels of social satisfaction. Similarly, Kwan et al. (2020) highlighted the positive impact of peer support programs in fostering social inclusion and reducing isolation among children with neurodevelopmental disabilities.

Allport's CT provides a robust framework for addressing explicit and implicit biases and alleviating social isolation and loneliness among individuals with disabilities. By emphasizing equal status, common goals, intergroup cooperation, and sustained contact, the theory offers practical strategies for creating inclusive environments. These interventions leverage the principles of structured, meaningful contact to foster positive intergroup interactions, promote inclusivity, and enhance social connectedness. These strategies can be effectively applied in educational, workplace, and social contexts to reduce prejudice, alleviate loneliness, and support the well-being and inclusion of individuals with disabilities.

2.5: Interventions to Reduce Disability-Related Biases

Contact-Based Interventions

Direct contact, involving face-to-face interactions, is one of the most straightforward applications of Allport's CT. Lee (2016) demonstrated the efficacy of direct contact in reducing negative attitudes toward people with intellectual or developmental disabilities (IDD). In his study, Korean-American adolescents who engaged in structured, meaningful interactions with

peers with IDD showed significant improvements in their attitudes. Similarly, Falanga et al. (2011) observed that Italian college students' attitudes towards individuals with disabilities improved significantly after direct contact with a rehabilitation center program.

Indirect contact refers to exposure to outgroup members through narratives, media, or knowing that an ingroup member has a friendship with an outgroup member. Paluck and Green (2009) highlighted the potential of media interventions to reduce prejudice, noting that narratives and storytelling can effectively change attitudes by humanizing outgroup members and fostering empathy. Indirect contact serves as a valuable tool in environments where direct contact is not feasible, providing a bridge toward more positive intergroup relations.

Extended contact involves learning that an ingroup member has a close relationship with an outgroup member. Binder et al. (2009) conducted a longitudinal study across three European countries and found that extended contact significantly reduced prejudice among both majority and minority group members. This type of contact can reduce prejudice by expanding social networks and normalizing positive intergroup interactions, particularly in contexts where direct contact is limited.

The effectiveness of these contact-based interventions is well-supported by empirical research. Pettigrew and Tropp's (2006) meta-analysis of intergroup contact studies revealed that both direct and indirect forms of contact can lead to significant reductions in bias, particularly when the conditions of equal status, common goals, intergroup cooperation, and institutional support are met. Additionally, Paluck and Green (2009) emphasized the importance of well-designed field experiments to test the real-world applicability of these interventions, advocating for rigorous methodologies to assess their impact.

Quality and Duration of Contact

Effective intergroup contact requires several key conditions to be met: equal status, common goals, intergroup cooperation, a supportive environment, and opportunities for sustained contact (Allport, 1954; Pettigrew & Tropp, 2006). However, the minimum amount of contact necessary to significantly reduce bias or prejudice can vary depending on several factors, including the nature of the contact, the quality of interactions, and the specific context of intergroup relations. Research in this area suggests some general guidelines and findings.

For studies involving brief contact between different groups, even a single positive interaction between individuals from different groups can have a measurable impact on reducing bias and prejudice. This might include a short conversation, working together on a task, or participating in a brief shared activity (Pettigrew & Tropp, 2006). Importantly, the key is not just the duration of the contact but the quality of the interaction. Meaningful, positive, and cooperative interactions tend to be more effective in challenging stereotypes and fostering positive attitudes (Allport, 1954; Pettigrew & Tropp, 2006). While a single interaction can initiate change, multiple interactions over time are typically more effective in sustaining and deepening attitude change (Paluck & Green, 2009). Furthermore, regular and consistent exposure to positive intergroup contact is essential for long-term attitude change.

Examples of brief contact experiences demonstrate that these interactions can range from 15 minutes to one hour per session. Swart et al. (2011) reported contact sessions lasting approximately 30 minutes each over several weeks. This study found that repeated brief contact sessions reduced intergroup anxiety and increased positive outgroup attitudes among participants. The cumulative effect of these short, frequent interactions helped participants develop more empathetic and understanding perspectives towards outgroup members (Swart et

al., 2011). Similarly, Vezzali et al. (2015) utilized short interventions around 30 minutes per session conducted over multiple days, highlighting the cumulative effect of repeated brief contacts. The participants showed significant improvements in their attitudes towards the outgroup, reduced intergroup anxiety, and increased empathy after multiple brief interactions (Vezzali et al., 2015).

Additionally, Paolini et al. (2010) discussed single encounters typically lasting 15 to 30 minutes. This research demonstrated that even single, brief encounters could significantly improve attitudes towards outgroup members, with participants reporting reduced prejudice and increased willingness to engage in future interactions with the outgroup (Paolini et al., 2010). Pettigrew and Tropp (2006) also noted that effective brief contact interventions often involved single sessions lasting from 20 minutes to one hour. Their meta-analysis revealed that even brief, structured intergroup contacts could significantly reduce prejudice, especially when the interactions involved cooperative tasks and equal status between participants (Pettigrew & Tropp, 2006).

It is important to note that there are individual differences that can influence the amount of contact needed to induce change. For example, individuals with stronger initial biases may require more sustained and intense contact to experience significant attitude change (Pettigrew, 1998). Furthermore, the effectiveness of contact interventions can vary depending on several factors, including the nature of the groups involved and the broader socio-political climate (Dixon et al., 2005). Additionally, characteristics such as openness to new experiences and empathy can also impact the effectiveness of contact in reducing bias.

In summary, while a single positive interaction can initiate attitude change, multiple interactions over time are typically more effective in sustaining and deepening attitude change.

Studies involving brief contact have demonstrated significant improvements in biases with sessions between 15 minutes to an hour. Additionally, the quality of interactions and the contextual factors surrounding the contact are critical in determining its effectiveness.

Cooperative Activities and Video Games

Cooperative activities and video games have emerged as innovative methods for facilitating positive intergroup contact. These mediums provide unique opportunities for individuals from different backgrounds to engage in shared goals and collaborative tasks. Paluck and Green (2009) highlighted the success of cooperative learning programs in educational settings, where students work together towards common academic goals. These programs not only improve academic performance but also foster positive intergroup attitudes by emphasizing collaboration over competition.

Video games, particularly those that require cooperation, have shown great potential in reducing prejudice and fostering social connections. Adachi and colleagues (2015) explored how cooperative video game play can enhance intergroup relations. Their research indicates that cooperative gaming promotes positive attitudes towards gaming partners, even if those partners belong to different social or ethnic groups. Depping et al. (2018) further examined how interdependent play within video games influences the formation of social capital and psychological well-being. They found that interdependent play, where players rely on each other to achieve common goals, significantly enhances social bonds and reduces feelings of loneliness.

The effectiveness of cooperative activities and video games in reducing biases and social isolation is well-documented. Wohn et al. (2011) demonstrated that social network games on platforms like Facebook help maintain and enhance relationships, thereby reducing feelings of

loneliness. These games provide low-cost, accessible means for individuals to engage in meaningful social interactions, which are crucial for mental health and social well-being. Lai et al. (2023) conducted a feasibility trial using virtual reality (VR) gaming to improve social isolation and loneliness among adolescents with physical disabilities. Their findings suggest that VR gaming can significantly enhance social connections and reduce loneliness, highlighting the potential of immersive, interactive environments for promoting social inclusion.

Rationale for Use of Video Games

While extensive research supports the use of Allport's CT in reducing biases through structured intergroup interactions, there is a notable gap in the literature regarding the application of this theory in digital environments, specifically through cooperative video games. Traditional contact-based interventions have demonstrated efficacy in various settings, including educational and workplace environments, by promoting equal status, common goals, intergroup cooperation, and sustained contact (Allport, 1954; Pettigrew & Tropp, 2006). However, the rapid advancement of technology and the increasing popularity of video games among youth present an untapped opportunity for applying CT in innovative ways.

Research on cooperative video games has primarily focused on general social outcomes, such as enhanced cooperation and reduced aggression among players (Adachi et al., 2015). However, there is limited empirical evidence examining the specific impact of cooperative video games on reducing biases toward individuals with disabilities and alleviating their social isolation and loneliness. While Depping and colleagues (2018) highlighted the potential of video games to foster social bonds and reduce loneliness, the application of these findings to disability-related biases remains underexplored.

Addressing this research gap is crucial for several reasons. First, students with disabilities often face unique challenges in forming social connections due to physical, social, and environmental barriers (Gómez-Zúñiga et al., 2023). Cooperative video games offer a unique platform where these barriers can be minimized, providing an accessible and engaging medium for fostering positive intergroup interactions. By engaging in cooperative tasks within a game, players can experience equal status interactions and work towards common goals, essential conditions for reducing prejudice according to CT.

Second, video games can offer sustained and repeated contact in a controlled environment, allowing for consistent positive interactions over time. This sustained contact is vital for meaningful attitude change and the development of genuine friendships (Pettigrew & Tropp, 2006). The immersive and interactive nature of video games can create a compelling context for these interactions, potentially leading to deeper empathy and understanding between players.

The use of video games as a medium for positive intergroup contact is supported by several factors. First, video games are widely accessible and popular across various demographics, making them an effective tool for reaching diverse populations. Second, games provide immersive environments where players can engage in cooperative tasks, fostering teamwork and mutual understanding. Third, the interactive nature of games allows for repeated and sustained contact, which is essential for long-term attitude change (Pettigrew & Tropp, 2006).

Additionally, video games can be designed to specifically target social and cognitive skills, making them versatile tools for educational and therapeutic purposes. Cooperative gaming can help individuals develop empathy, improve communication skills, and learn to work

effectively with others, all of which are crucial for reducing prejudice and promoting social inclusion (Depping et al., 2018).

Interventions to reduce disability-related biases require a multifaceted approach, combining traditional contact-based methods with innovative techniques like cooperative activities and video games. By fostering meaningful interactions through cooperative video game play, and ensuring that these interactions are of high quality and sustained duration, it is possible to significantly reduce prejudice and promote social inclusion. The integration of these strategies, grounded in Allport's CT, provides a comprehensive framework for creating inclusive environments that support the well-being and social integration of individuals with disabilities.

Potential Impact of the Study

A study exploring the use of cooperative video games to apply CT principles could provide significant insights into new, effective interventions for reducing biases and social isolation among students with disabilities. Such research could demonstrate how digital environments can be leveraged to promote social inclusion and challenge negative stereotypes, offering practical implications for educators, policymakers, and game developers.

Furthermore, this study could contribute to the broader field of intergroup contact research by extending the application of CT beyond traditional settings. By examining the mechanisms through which cooperative video games influence attitudes and social connections, researchers can gain a deeper understanding of how these interactions can be harnessed to foster inclusive and supportive communities.

The integration of cooperative video games and CT presents a promising but underexplored avenue for addressing disability-related biases and social isolation. By filling this research gap, we can develop innovative interventions that not only reduce prejudice but also

enhance the social well-being of students with disabilities. This approach aligns with the evolving landscape of social interactions in the digital age, offering new possibilities for creating inclusive environments that support the well-being and integration of all individuals.

CHAPTER 3: METHODOLOGY

The study's potential to extend the application of CT into digital spaces necessitates a robust and rigorous methodology. By leveraging cooperative video games as a medium for positive intergroup contact, this research aims to provide empirical evidence on the efficacy of such interventions in reducing explicit and implicit biases and enhancing social well-being among students with disabilities. The following sections describe the research design, participant selection, data collection instruments, and analytical procedures, ensuring a comprehensive and replicable study framework.

3.1: Design

This study adopted a quasi-experimental design leveraging an explanatory sequential mixed method (Creswell & Creswell, 2018) to comprehensively explore the impact of positive cooperative contact on explicit and implicit biases towards individuals with disabilities, as well as the effects on feelings of loneliness and social isolation among students with disabilities. The explanatory sequential design involved two distinct phases: an initial quantitative phase followed by a qualitative phase to further explain and elaborate on the quantitative results.

Phase 1: Quantitative Phase

In the first phase, quantitative data was collected to measure the primary dependent variables: explicit and implicit biases towards individuals with disabilities, and subjective feelings of loneliness and social isolation. The instruments used in this phase include:

1. Multiple Disability Multidimensional Attitudes Scale (MDMAS; Park et al., 2023): To assess explicit biases towards individuals with various types of disabilities.
2. Disability Attitude Implicit Association Test (DA-IAT; Pruett & Chan, 2006): To measure implicit biases towards individuals with disabilities.

3. Contact with Disabled Persons Scale (CDP; Yuker & Hurley, 1987): To measure the amount of contact that participants have with individuals with disabilities.
4. UCLA Loneliness Scale - Version 3 (Russel et al., 1996): To measure subjective feelings of isolation and loneliness.
5. Belonging, Engagement, and Self-confidence (BES) (Yorke, 2016): To measure is students' sense of belonging to their institution, their level of academic engagement, and their self-confidence in higher education.

The within-subjects design of this study involved collecting data at three time points: baseline (pre-intervention), immediately following the intervention (post), and at follow-up. To evaluate the intervention's effects, paired-samples t-tests were conducted to compare posttest scores with pretest scores (to assess change) and follow-up scores with posttest scores (to assess retention).

Phase 2: Qualitative Phase

The second phase involved qualitative data collection to provide a deeper understanding of the quantitative findings. Semi-structured interviews were conducted with a subset of participants from the quantitative phase. These interviews aimed to explore participants' personal experiences, perceptions, and reflections on their interactions and the effects of these interactions on their biases and feelings of social isolation.

Integration of Quantitative and Qualitative Data

The integration of quantitative and qualitative data occurred during the interpretation phase. The qualitative findings were used to explain and elaborate on the quantitative results, offering insights into why certain changes in biases and feelings of isolation occurred (Creswell

& Creswell, 2018). This approach allowed for a more nuanced understanding of the mechanisms underlying the observed effects and the contextual factors that influence these outcomes.

Rationale for Using Explanatory Sequential Design

An explanatory sequential mixed methods design was particularly well-suited for this study because it allowed for a comprehensive analysis, where the combination of quantitative and qualitative data provides a more complete understanding of the impact of cooperative contact on biases and social isolation (Creswell & Creswell, 2018). Qualitative data helps to contextualize and explain the quantitative results, uncovering underlying processes and participant perspectives that quantitative data alone may not reveal. Furthermore, the initial quantitative phase identifies patterns and changes in biases and social isolation, while the subsequent qualitative phase delves into the reasons behind these patterns, providing a richer, more detailed understanding.

This approach ensures that the study not only measures changes but also explores the context and experiences that contribute to these changes, offering a holistic view of the effects of cooperative contact. By adopting this design, the study aims to not only quantify changes in attitudes and well-being but also to uncover the lived experiences of participants, thereby offering actionable insights for designing effective interventions to reduce biases and improve social integration for individuals with disabilities.

3.2: Research Questions

1. What are the disability-related biases of disability services students?
    a. What are the explicit disability-related biases of disability services students?
    b. What are the implicit disability-related biases of disability services students?

c. Do demographic features like years of age, gender, race/ethnicity affect the disability-related biases of disability services students?

d. Does the amount of prior contact with individuals with disabilities affect the disability-related biases of disability services students?

2. Does a cooperative video game play experience have an effect on the disability-related biases of disability services students?

    a. Does a cooperative video game play experience have an effect on the explicit disability-related biases of disability services students?

    b. Does a cooperative video game play experience have an effect on the implicit disability-related biases of disability services students?

    c. Does the effect of a cooperative video game play experience on disability-related biases vary based on the amount of prior contact with individuals with disabilities?

    d. Does a cooperative video game play experience have an effect on the disability-related biases of disability services students while controlling for covariates such a demographic features?

3. What are the levels of social isolation among students with disabilities?

    a. What are the subjective feelings of loneliness among students with disabilities?

    b. What are the subjective feelings of belonging among students with disabilities?

4. Does a cooperative video game play experience have an effect on the subjective feelings of students with disabilities?

    a. Does a cooperative video game play experience have an effect on the subjective feelings of loneliness among students with disabilities?

b. Does a cooperative video game play experience have an effect on the subjective feelings of belonging among students with disabilities?

Regarding the first research question, we hypothesize that there may be low levels of explicit bias toward individuals with disabilities among disability services students. However, levels of implicit bias toward individuals with disabilities may be low to moderate. We hypothesize that the following contact experience will significantly lower these levels of bias among disability services students and that these effects will see good retention upon follow-up. Regarding the third research question, we hypothesize that students with disabilities will report elevated feelings of loneliness and lower levels of belonging. Accordingly, we also hypothesize that the contact experience will similarly reduce the subjective feelings of isolation and loneliness and improve feelings of belonging among students with disabilities.

3.3: Participant Recruitment

A power analysis was conducted using G*Power to estimate a minimum sample size for the analysis in this study (Faul et al., 2009). The medium effect size ($f2$= .40) at power (1-β) = .80, with a corrected alpha level of .05, was used to calculate an adequate sample size, which indicated that a sample size of 12 dyads would be needed. However, due to recruitment constraints, a convenience sample of 18 students enrolled at Michigan State University was used in this research. Included in the sample were two groups, students with disabilities, and students without disabilities. Students without disabilities (n = 9) were recruited from the university's Rehabilitation Counseling, Special Education, School Psychology, and Social Work programs and students with disabilities (n = 9) were recruited with cooperation from the university's Resource Center for Persons with Disabilities (RCPD). Students were contacted via email and in-person classroom visits during the semester and invited to fill out a preliminary eligibility survey

for inclusion and exclusion. Students were then instructed to share their availability for the three cooperative gaming sessions. Participants were then assigned to dyads (n = 9) based on their mutual availability for the three cooperative gaming sessions. Those that were not successfully paired were notified via email and placed on a waitlist, per their request, in the event that any participants were unable to proceed with the study.

Inclusion Criteria:

- Students with Disabilities: Participants must be currently enrolled as students at Michigan State University.
- Disability Services Students (Non-Disabled Group): For the non-disabled group, participants must be enrolled in Disability Service Programs like Rehabilitation Counseling, Special Education, School Psychology, or Social Work programs at MSU.
- Students with Disabilities (Disabled Group): For the disabled group, participants must be registered with the university's Resource Center for Persons with Disabilities (RCPD).
- Age: Participants must be at least 18 years old.
- Consent: Participants must provide informed consent to participate in the study.

Exclusion Criteria:

- Non-Students: Individuals who are not currently enrolled as students at Michigan State University will not be included in the study.
- Other Programs (Non-Disabled Group): Students who are not enrolled in Disability Service Programs
- Age: Students under 18 years old will be excluded.
- Non-Consent: Students who do not provide informed consent will be excluded from the study.

These criteria were established to ensure a homogeneous sample within each group and to maintain the focus on the specific populations of interest: non-disabled disability services students and students with ADHD, Autism Spectrum Disorder, and/or Mental Health Disorder. However, due to practical recruitment concerns, the students with disabilities sample was opened to all disabilities registered with the RCPD. (Refer to demo table in Chapter 4) This approach facilitates a clear comparison of the impact of cooperative contact on biases and feelings of social isolation across the defined groups while simultaneously gathering the largest sample available.

3.4: Instrumentation

Multiple Disability Multidimensional Attitude Scale (MDMAS: Park et al., 2023) The MDMAS is a recently developed measure designed to assess explicit biases towards individuals with various types of disabilities. It evaluates attitudes across four specific disability types: anxiety disorder, autism spectrum disorder (ASD), blindness, and schizophrenia. The instrument consists of vignettes describing interactions with individuals with these disabilities, followed by 34 items on a 5-point Likert-type scale ranging from 1 (not at all) to 5 (very much). Scores are reported as averages of each subscale such that the range similarly is between 1 and 5. Higher scores indicate more negative attitudes toward individuals with disabilities. The MDMAS has demonstrated strong psychometric properties. Confirmatory factor analyses supported a four-factor structure (calm, negative affect, positive cognition, behavioral avoidance) as a good fit for all four disability types. In the initial validation of the Multiple Disability Multidimensional Attitude Scale (MDMAS), Park et al. (2023) administered MDMAS-Anxiety to 243 participants, yielding mean scores of 4.04 (SD = 0.87) on Calm, 1.70 (SD = 0.83) on Negative Affect, 2.90 (SD = 0.85) on Positive Cognition, and 1.78 (SD = 0.77) on Behavioral Avoidance, suggesting

moderately favorable overall attitudes toward individuals with anxiety disorders. By comparison, the MDMAS-ASD was administered to 250 participants, resulting in means of 4.61 (SD = 0.60) on Calm, 1.83 (SD = 0.75) on Negative Affect, 3.33 (SD = 0.80) on Positive Cognition, and 1.87 (SD = 0.82) on Behavioral Avoidance, indicating relatively higher calm and positive cognitions—and thus somewhat more positive attitudes—toward individuals with autism spectrum disorders. The internal consistency reliability (Cronbach's alpha) for the subscales across the different disabilities ranged from .75 to .91, indicating good to excellent reliability. This scale allows researchers to compare attitudes based on different disability types, providing significant insights into the nature of disability-related biases (Park et al., 2023). The MDMAS is employed in this study to measure explicit biases towards individuals with various disabilities. Assessing explicit biases is crucial for understanding the impact of cooperative contact interventions on participants' attitudes. The strong psychometric properties of the MDMAS ensure reliable and valid measurement of explicit biases, making it a valuable tool for evaluating the effectiveness of bias reduction initiatives.

Disability Attitude Implicit Association Test (DA-IAT; Pruett & Chan, 2006). Adapting from an implicit association test assessing racial attitudes, Pruett and Chan (2006) developed the DAIAT which examines implicit attitudes toward people with disabilities. This paper-based DA-IAT consists of two sets of practice and actual tests (only the actual test set is used to calculate a score), based on the formula identified by previous studies (Lemm et al., 2008; Pruett & Chan, 2006). Each set includes one instruction page and two practice or test pages. The time given to respondents should be 20s per page, consistent with the administration time used by Pruett and Chan (2006). The practice test is given to help respondents become familiar with testing by asking them to categorize insect–flower or good–bad words properly.

For the actual test, respondents are asked to categorize disability–nondisabled symbols or good–bad words as much as possible. Symbols and words are presented within a block where disability symbols are paired with good words and nondisabled symbols are paired with bad words (i.e., incongruent pairs), or vice versa (i.e., congruent pairs). It was assumed that an individual would find difficulty associating disability symbols with positive words if he or she has negative attitudes toward people with disabilities (Pruett & Chan, 2006). Pruett and Chan (2006) reported a mean composite (D) score of –1.42 (SD = 3.18) on a scale spanning roughly –14 to +7, reflecting a tendency for participants to associate disability with negative attributes faster than with positive ones, although the magnitude of this implicit preference varied widely. The test-retest reliability identified by the Pruett and Chan study was .78. The DA-IAT is utilized in this study to measure implicit biases towards individuals with disabilities. Implicit biases are unconscious attitudes that can influence behavior and decision-making. By using the DA-IAT, the study can capture these automatic associations that may not be reflected in explicit self-reports. This provides a more comprehensive understanding of participants' attitudes towards disabilities. The DA-IAT's established reliability ensures consistent measurement, making it a valuable tool for assessing the impact of cooperative contact interventions on implicit biases. Understanding changes in implicit biases is crucial for evaluating the overall effectiveness of the intervention in reducing prejudice at both conscious and unconscious levels.

Contact with Disabled Persons Scale (CDP; Yuker & Hurley, 1987). The CDP is a unidimensional instrument developed to measure the amount of contact people have had with individuals with disabilities (Yuker & Hurley, 1987). It consists of 20 items on a 5-point Likert-type scale ranging from 1 = never to 5 = very often. Higher scores indicate more frequent

contact experiences with individuals with disabilities, total scores range from 20 to 100, with higher scores indicating more frequent or extensive contact. Collecting from five different samples, Yuker and Hurley (1987) reported median split-half coefficients of .87 and median coefficient alpha estimates of .92. The CDP is used in this study to quantify the frequency and extent of participants' prior contact with individuals with disabilities. Understanding the baseline level of contact is crucial for interpreting changes in biases and attitudes resulting from the intervention. This measure provides a standardized way to assess prior experiences, which can influence the effectiveness of the cooperative contact interventions. By accounting for previous contact, the study can more accurately attribute changes in biases and social isolation to the intervention itself, rather than to pre-existing levels of contact with individuals with disabilities.

UCLA Loneliness Scale - Version 3 (Russel et al., 1996). A 20-item scale designed to measure one's subjective feelings of loneliness as well as feelings of social isolation. Participants rate each item on a scale from 1 (Never) to 4 (Often). This measure is a revised version of the original UCLA Loneliness Scale. The main reason for this revision was to make 10 of the 20 original items reverse-scored. This scale has been revised again to simplify the wording. Total scores range from 20 to 80, with higher scores indicating greater loneliness. Results indicated that the measure was highly reliable, both in terms of internal consistency (coefficient ranging from .89 to .94) and test-retest reliability over a 1-year period (r = .73). The UCLA Loneliness Scale is employed in this study to assess the subjective feelings of loneliness and social isolation among participants, particularly those with disabilities. Measuring these feelings is essential for understanding the psychological impact of the cooperative contact interventions. By using a well-validated and reliable instrument like the UCLA Loneliness Scale, the study can accurately capture changes in participants' feelings of loneliness and social isolation over time. This

provides valuable insights into how cooperative activities may alleviate social isolation and enhance the well-being of students with disabilities.

Belonging, Engagement, and Self-confidence (BES) (Yorke, 2016) is designed to assess students' sense of belonging to their institution, their level of academic engagement, and their self-confidence in a higher education context. The BES scale is administered either online or through hard copies, with institutions typically choosing the method that best suits their context. The scale includes 16 items divided into three subscales: Belonging (6 items), Engagement (6 items), and Self-confidence (4 items). The items invite responses on a five-point scale ranging from 'strongly agree' to 'strongly disagree,' with some items reverse-scored to ensure response accuracy and reduce the likelihood of response sets. Subscale scores are averaged, resulting in possible scores ranging from 1 to 5 for each subscale. Higher scores indicate greater levels of belongingness, engagement, or self-confidence. The BES has been demonstrated to possess strong psychometric properties. During the initial pilot phase, the BES scale underwent rigorous testing for reliability and validity. The pilot involved 709 first-year students across four universities, followed by a larger administration with 2841 students from 13 universities. Principal components analysis with varimax rotation confirmed that the BES scale items formed three distinct components: belongingness, engagement, and self-confidence. The internal consistency of the scales was high, with Cronbach's alpha coefficients of 0.76 for belongingness, 0.76 for engagement, and 0.72 for self-confidence. Subsequent administrations of the survey reaffirmed these reliability metrics, indicating the scale's stability and robustness over time (Yorke, 2016). The validity of the BES scale is further supported by its alignment with established theoretical constructs and its ability to distinguish between different demographic groups, making it a valuable tool for assessing student experiences in higher education.

Demographic Information. At the beginning of the semester, participants were asked to provide their demographic information including age, gender, race/ethnicity, disability status and current program at MSU. Collecting demographic information is essential for understanding the background and context of the study participants. This data allows for the analysis of potential moderating effects of demographic variables on the study outcomes. For instance, factors such as age, gender, and race/ethnicity can influence biases, academic engagement, self-efficacy, and feelings of loneliness. By including demographic information, the study can control for these variables in the analysis, ensuring that the results are not confounded by demographic differences. Additionally, this information can help identify any demographic patterns or trends in the data, providing a more nuanced understanding of the impact of cooperative contact interventions.

Semi-structured Interviews. A subset of participants will undergo semi-structured interviews to gauge their experiences with the lab, to understand their perceptions of the conditions for effective contact and the quality of the contact experience (Equal Status, Cooperation, and Supportive Environment), and to capture any qualitative dimensions or individual differences amongst participants missed by the other instruments. Topics of discussion during the semi-structured interviews will include: Initial Perceptions and Expectations, Experience During the Lab Sessions, Perceptions of Contact Conditions, Changes in Attitudes and Biases, Impact on Social Isolation and Loneliness, Overall Impressions and Suggestions, and Individual Differences and Additional Insights (see Appendix A).

3.5: Procedure

Following approval from the Institutional Review Board, data was collected three times during the 2024 fall academic semester (the first day of the intervention, after the completion of

the lab portion, and at the end of the semester). Prior to the start of the intervention, prospective participants were contacted via email and in-person classroom visits to participate in the study. The emails and visits provided students with a flyer containing information about the study, including informed consent (see Appendix B) and a link to a Qualtrics survey to determine their eligibility for the study. As an incentive for participation, students earned a $10 gift card following each cooperative gameplay session, and an additional $20 gift card following the final data collection, totaling a single $60 gift card if all sessions and follow-up were attended. These incentives were designed to encourage consistent participation and completion of all data collection points. Based on the eligibility and availability data, nine dyads were formed and accessible conference rooms on the first floor of the research building were reserved for the 27 cooperative gaming sessions. Participants received email confirmations and calendar reminders for each of their scheduled sessions.

Within the first two weeks of the start of the intervention, all participants met with the lead researcher to review the informed consent and details of the study. Prior to the start of the first cooperative gaming session, disability services students were invited to complete the Multiple Disability Multidimensional Attitude Scale (MDMAS: Park et al., 2023), the Contact with Disabled Persons Scale (CDP; Yuker & Hurley, 1987), the Belonging, Engagement, and Self-confidence scale (BES) (Yorke, 2016), the Disability Attitude Implicit Association Test (DA-IAT; Pruett & Chan, 2006), and provide their demographic information (Table 1). The MDMAS, CPD, and BES were offered online via a Qualtrics link, and the DA-IAT was administered via paper and pencil. Disability services students were given 40 seconds per page (20 seconds per column) instead of the 20 seconds per page consistent with the administration time used by Pruett and Chan (2006) to complete the DA-IAT, this administration was kept

consistent across the entire data collection process with the DA-IAT. Students with disabilities were similarly assessed with the UCLA Loneliness Scale - Version 3 (Russel et al., 1996), and the BES (Yorke, 2016) and were also asked to provide their demographic information online via a Qualtrics link (Table 1). To assure confidentiality, all participants were assigned a unique PID during the first session and were instructed to record it in a personal location for reference in completing subsequent surveys.

Table 1

Quantitative Measures and Groups

Measure	Students without Disabilities	Students with Disabilities
Multiple Disability Multidimensional Attitude Scale (MDMAS)	Yes	No
Disability Attitude Implicit Association Test (DA-IAT)	Yes	No
Contact with Disabled Persons Scale (CDP)	Yes	No
Belonging, Engagement, and Self-confidence (BES)	Yes	Yes
UCLA Loneliness Scale - Version 3	No	Yes

Note. This table indicates which quantitative measures are given to participants in this study.

Dyads were formed by pairing disability services students with students with a disability based on their mutual availability for the cooperative gaming sessions. Before the start of the lab experience, the researcher met with the participants to remind them of their overall objectives for the lab. The lab, which is modeled after Allport's four features of CT, consisted of 45 minutes of cooperative video game play structured to meet Allport's hypothesis of "optimal contact." Rigorous planning and scheduling were necessary to work with each dyad to find times to meet during the semester. Dyads received email confirmations and calendar reminders for each of

their scheduled sessions. If a participant did not accept the calendar invitation for a session or was not present at the scheduled beginning of a session, they were contacted via email inquiring about the need to reschedule. After 30 minutes without both participants present, the researcher would proceed to cancel the session and reschedule. Due to numerous life events and illnesses among the participants, more than half of the originally scheduled sessions required rescheduling. Additionally, the researcher was unable to maintain contact with one of the original members of a dyad, and after two missed sessions without contact, they were informed of their ineligibility via email, and a waitlisted participant was brought in as a replacement.

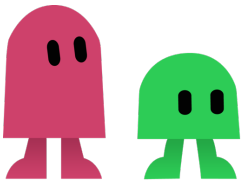
The researcher arrived at the reserved conference space 30 minutes prior to the start of each session to confirm the reservation and ensure that the Nintendo Switch game console was properly set-up and connected to the AV system. Additional controllers, controller-grips, and sanitation wipes were brought to ensure the comfort of the participants and that the game could be played if any hardware issues arose. Sessions began with brief check-ins with the dyad, offering opportunities to voice any questions or concerns, or casually converse before starting the cooperative video game. The video game chosen for this lab experience was the cooperative puzzle platformer *Ibb & Obb*.

The primary gameplay objective was for the two players to navigate to the end of each level while collecting gems by working together to solve physics puzzles and defeat enemies. The two player characters travel through a world divided by a thin horizon line; on either side of the barrier, everything is inverted and gravity works in opposite directions. Importantly, the puzzles and enemies require teamwork, communication, and timing to navigate successfully, thereby necessitating intergroup cooperation. The player characters, Ibb and Obb (Figure 1), operate exactly the same and have the same capabilities in the game, the differences in their

color and height are merely aesthetic means to distinguish them from one another. This facilitates equal status between the participants during the gameplay session.

Figure 1

The Player-controlled Characters in Ibb & Obb



Note. This figure depicts the green creature, Ibb, and the pink creature, Obb, the player-controlled characters in *Ibb & Obb*. Despite what appears to be a hight difference, the two characters' functions are the same, offering no distinct advantages in gameplay.

Players were randomly assigned to the first or second player designation and, after a brief introduction to the mechanics of the game, were instructed to complete as many levels and collect as many gems as they can in the given time, providing the participants with common goals. During the gameplay sessions, participants were encouraged to take breaks as necessary. Dyads naturally encountered difficulties with some challenges or aspects of the game. As the emphasis was on positive cooperative contact between students with disabilities and disability services students, in-game help provided by the researchers was kept to a minimum to encourage the dyads to work with one another to solve emergent challenges. After three cooperative video gaming sessions, constituting three hours of sustained and meaningful contact, students were again invited to complete the surveys.

After the final gameplay session, participants were instructed to fill out their surveys in the same administration as the pre-test. They were also reminded of the need to follow up at the end of the semester to examine any retention of effects and receive their full compensation. The researcher worked with each participant to schedule a time for the third and final data collection

near the end of the fall semester. Additionally, a subset of participants was selected to take part in semi-structured interviews several weeks after the final gameplay session. All participants were invited to participate in the qualitative portion, however, only 5 participants from the students with disability sample were available to be interviewed. The researcher worked with each participant to schedule a 1 hour Zoom meeting for the semi-structured interviews. Ethical considerations, including informed consent and the right to withdraw at any time, were emphasized before each interview began. Participants were not compensated further for their participation in the semi-structured interviews.

Each interview lasted approximately one hour and was conducted exclusively via Zoom. Interviews were recorded with participants' consent and transcribed using Zoom's built-in transcription feature. Additionally, rigorous notes were taken during the interviews to capture key insights and contextual details. A structured interview guide was designed to gauge how well the intervention maintained components of Allport's Contact Theory, as well as determine the subjective impact on social inclusion, specifically loneliness and belonging. The guide included open-ended questions designed to elicit in-depth responses regarding participants' experiences and perspectives. Sample questions included: "Did you feel like you and your partner had equal roles during the gaming sessions?" and "Did these sessions affect your sense of connection or belonging? How?"

3.6: Data Handling, Cleaning, and Missing Data

Data Handling. All data collected in this study will be recorded electronically using secure, password-protected systems. Personal identifiers will be removed, and unique codes will be assigned to each participant to protect their anonymity. The data will be stored on encrypted servers with access restricted to authorized personnel only. In accordance with Institutional

Review Board (IRB) guidelines, informed consent will be obtained from all participants, clearly outlining their rights, the purpose of the study, and how their data will be used and protected. Regular audits will be conducted to ensure compliance with data protection policies, and any breaches of confidentiality will be promptly addressed and reported to the IRB.

Data Cleaning. In this study, rigorous data cleaning procedures will be employed to ensure the accuracy and reliability of the dataset. The initial phase involves verifying the accuracy of data entries by cross-referencing them with the original sources. This process helps to identify and correct any discrepancies or errors (Osborne, 2013). Outliers will be detected using statistical methods and assessed to determine whether they should be retained, transformed, or excluded based on their potential impact on the analysis (Iglewicz & Hoaglin, 1993). Consistency checks will be conducted to ensure coherence across related variables, addressing any inconsistencies through logical checks and data validation techniques (Kang, 2013).

Missing Data. To address the issue of missing data in this study, the Pairwise Deletion strategy will be employed. This approach will help ensure that our analyses remain robust and comprehensive despite any incomplete responses from participants. Pairwise Deletion involves excluding only those specific data points where values are missing for the analysis being conducted, rather than removing entire cases. This allows for the retention of as much data as possible.

The main advantage of this method is its efficiency in maximizing data usage, which reduces the loss of valuable information. By utilizing all available data points for each analysis, Pairwise Deletion ensures that our findings are based on the most complete dataset possible. This method is particularly beneficial in maintaining the integrity of the data and providing a more

comprehensive understanding of the relationships between variables (Schafer & Graham, 2002). However, it is important to consider that Pairwise Deletion can lead to inconsistencies in sample sizes across different analyses, as each analysis may include a different subset of data depending on which variables have missing values.

Additionally, there is a potential risk of bias if the missing data is not randomly distributed. To mitigate this, the patterns of missing data will be examined to ensure they do not systematically differ from the complete data (Tabachnick & Fidell, 2013). Overall, Pairwise Deletion provides a practical solution for handling missing data in this study, allowing us to maintain the robustness and reliability of our analyses while maximizing the use of the collected data.

3.7: Data Analysis

Descriptive statistics, including frequencies, means, and standard deviations, will be calculated to examine the demographic characteristics of the sample. This initial analysis will provide an overview of the participants' backgrounds, such as age, gender, race/ethnicity and prior contact with individuals with disabilities, which may influence the study's outcomes.

Quantitative Data Analysis. Paired-samples t-tests were conducted to address the primary research questions. The within-subjects design involved collecting data at three time points—pretest, post-lab, and end of semester—allowing each participant to serve as their own control. One set of paired t-tests compared pretest and post-lab scores to assess immediate changes in the dependent variables (explicit biases, implicit biases, and subjective feelings of loneliness and belonging), while a second set compared post-lab and end-of-semester scores to examine retention of these changes over time. This approach enabled us to determine whether the intervention produced significant changes in the measured outcomes.

Hypotheses to be Tested:

1. The explicit bias toward individuals with disabilities would be low, while implicit bias levels would also be low among disability services students.
2. Female students and nonwhite students will exhibit lower disability-related bias than male or white disability service students.
3. Greater prior contact with individuals with disabilities will be associated with lower disability-related biases among disability services students.
4. There will be a significant reduction in explicit biases towards individuals with disabilities among disability services students after the intervention.
5. There will be a significant reduction in implicit biases towards individuals with disabilities among disability services students after the intervention.
6. Students with disabilities will report elevated feelings of loneliness and lower levels of belonging in the college environment.
7. There will be a significant improvement in feelings of loneliness and belonging among students with disabilities after the intervention.

Assumptions to Check. To ensure the validity of the paired-samples t-tests, several statistical assumptions were evaluated. First, the assumption of normality for the difference scores (e.g., post-lab minus pretest and end-of-semester minus post-lab) was examined by reviewing skewness and kurtosis values and through visual inspection of Q-Q plots (Wilk & Gnanadesikan, 1968). These descriptive indicators helped determine whether the distributions of the difference scores approximated normality. In addition, potential outliers were identified, as extreme values can affect the robustness of the t-test. These checks ensure that the results of the paired-samples t-tests are valid and interpretable.

Research Questions & Statistical Tests

1a. What are the explicit disability-related biases of disability services students?

1b. What are the implicit disability-related biases of disability services students?

Descriptive statistics (mean, standard deviation) will summarize the explicit and implicit biases of disability services students measured by the MDMAS and DA-IAT respectively (Hahs-Vaughn & Lomax, 2020).

1c. Do demographic features like years of education, age, gender, race/ethnicity, and current program at MSU affect the disability-related biases of disability services students?

Multiple regression will assess the impact of individual demographic features on disability-related biases (Agresti & Finlay, 2009).

1d. Does the amount of prior contact with individuals with disabilities affect the disability-related biases of disability services students?

Pearson correlation will assess the relationship between the amount of prior contact (measured by the Contact with Disabled Persons Scale) and disability-related biases (both explicit and implicit). Multiple regression analysis will further examine the predictive value of prior contact on biases while controlling for other variables (Agresti & Finlay, 2009).

2a. Does a cooperative video game play experience have an effect on the explicit disability-related biases of disability services students?

2b. Does a cooperative video game play experience have an effect on the implicit disability-related biases of disability services students?

Paired-samples t-tests were conducted to examine changes in biases across three time points (baseline, post-intervention, and follow-up). One set of t-tests compared baseline and post-intervention scores to assess immediate effects, while another set compared post-

intervention and follow-up scores to evaluate retention of these effects. Post-hoc analyses were used to further investigate any significant differences (Agresti & Finlay, 2009).

2c. Does the effect of a cooperative video game play experience on disability-related biases vary based on the amount of prior contact with individuals with disabilities?

ANCOVA (Analysis of Covariance) will assess whether the amount of prior contact (covariate) influences the effect of the video game intervention on explicit and implicit biases (Agresti & Finlay, 2009).

2d. Does a cooperative video game play experience have an effect on the disability-related biases of disability services students while controlling for covariates such a demographic features?

ANCOVA will examine the influence of demographic features (covariates) on the effect of the intervention. Interaction analysis in repeated measures ANOVA will explore if changes in biases differ across demographic groups (Agresti & Finlay, 2009).

3a. What are the subjective feelings of loneliness among students with disabilities?

3b. What are the subjective feelings of belonging among students with disabilities?

Descriptive statistics (mean, standard deviation) will summarize the subjective feelings of loneliness and belonging measured by the UCLA Loneliness Scale - Version 3 and BES respectively (Hahs-Vaughn & Lomax, 2020).

4a. Does a cooperative video game play experience have an effect on the subjective feelings of loneliness among students with disabilities?

4b. Does a cooperative video game play experience have an effect on the subjective feelings of belonging among students with disabilities?

Paired-samples t-tests were conducted to examine changes in loneliness and belonging, as measured by the UCLA Loneliness Scale - Version 3 and the BES, across three time points (baseline, post-intervention, and follow-up). One set of t-tests compared baseline and post-intervention scores to assess immediate effects, while another set compared post-intervention and follow-up scores to evaluate the retention of these effects. Post-hoc analyses were used to further explore any significant differences (Agresti & Finlay, 2009).

Qualitative Data Analysis. Data were analyzed using reflexive thematic analysis (RTA; Braun & Clarke, 2012, 2013, 2014, 2020). This approach acknowledges the active role of the researcher in identifying and interpreting patterns within the data. The analysis was conducted independently, with efforts made to ensure transparency and rigor in the interpretations. Codes were understood as interpretive constructs situated within the broader framework of the study's theoretical underpinnings and research questions (Braun & Clarke, 2019). This method, as described by Braun and Clarke (2006), involves six key phases that will be meticulously followed to ensure a thorough and credible analysis.

1. **Familiarization with the Data**: The initial phase involves immersing in the data by repeatedly reading the interview transcripts. This step is crucial for gaining a deep understanding of the content and context of the participants' responses. Notes and initial ideas for coding will be documented during this phase.
2. **Generating Initial Codes**: The second phase focuses on generating codes from the data. Coding will be performed systematically across the entire dataset, identifying significant features that are relevant to the research questions. Codes will be collated along with corresponding data extracts, enabling the identification of patterns and themes.

3. **Searching for Themes**: In the third phase, the codes will be examined to identify broader patterns of meaning. Themes will be developed by grouping similar codes together, considering the relationships between them. This process involves both inductive and deductive approaches, allowing for themes to emerge from the data while also considering existing theoretical frameworks.
4. **Reviewing Themes**: The fourth phase involves reviewing and refining the themes to ensure they accurately represent the data. This will be done in two stages: first, by reviewing the coded data extracts for each theme to check for coherence, and second, by reviewing the entire dataset to ensure that the themes reflect the data as a whole. Adjustments will be made to the themes and their definitions as necessary.
5. **Defining and Naming Themes**: Once the themes are finalized, the next phase involves defining and naming them. This step includes writing detailed analyses for each theme, clearly describing their scope and content. Each theme will be named to capture the essence of the data it represents.
6. **Producing the Report**: The final phase involves writing the report, where the themes will be presented in a coherent and logical manner. The report will include vivid and compelling data extracts that illustrate each theme, linking them back to the research questions and objectives. The analysis will be contextualized within the existing literature, highlighting the contributions of the study to the field.

Throughout this process, reflexivity was maintained by documenting analytic decisions, methodological choices, and evolving interpretations in an audit trail. This ensured transparency in the analytical approach and allowed for critical examination of potential influences on the findings.

3.7: Credibility and Trustworthiness

To enhance the credibility and trustworthiness of this qualitative study, strategies recommended by Brantlinger et al. (2005) were implemented. Although the analysis was conducted independently, rigorous self-reflective practices were employed to mitigate potential biases and maintain analytical rigor. This included maintaining an audit trail detailing coding decisions, emerging themes, and methodological adjustments.

Thick, rich descriptions were used to provide context and depth to the findings, ensuring that interpretations remained closely tied to participants' narratives. Member checking was not conducted due to logistical constraints, but significant effort was made to ensure accuracy in transcription and faithful representation of participant perspectives. Additionally, reflexive memo-writing documented positionality and its potential influence on the analytical process, fostering a more transparent and nuanced interpretation of the data.

These methodological rigor strategies, combined with a structured yet flexible thematic analysis approach, facilitated a robust and meaningful exploration of the qualitative data, complementing the insights gained from the quantitative phase of the study.

3.8: Ethical Considerations

All participants were informed of the purpose of the study, and consent was obtained in line with the standards set by the IRB prior to data collection. Participants were explicitly informed of their right to withdraw from the study at any time without penalty or loss of benefits. To protect the identities of the participants, all surveys were numbered prior to administration in the first session, and participants were asked to retain their unique identifier for subsequent measures. Disability information, recordings, and transcripts were anonymized to ensure confidentiality. Interview data were securely stored on encrypted devices and in password-

protected files. Only authorized research team members had access to the data. Anonymized data were used for analysis and reporting to ensure participants' privacy was maintained throughout the study.

CHAPTER 4: RESULTS

4.1: Introduction to Results

This chapter presents the findings of the study examining the impact of cooperative video gaming on disability-related biases and social inclusion among students with disabilities and disability services students. The results are structured to align with the study's explanatory sequential mixed-methods design, beginning with quantitative findings, followed by qualitative insights from participant interviews. By organizing the results in this manner, the chapter first provides a statistical overview of observed changes in explicit and implicit biases, loneliness, and belongingness, before incorporating qualitative perspectives that offer deeper context to the numerical data.

The quantitative results section will present descriptive statistics on the sample characteristics, including demographic information and prior contact with individuals with disabilities. This will be followed by statistical analyses addressing the study's key research questions: (1) baseline disability-related biases, (2) the effect of cooperative video game play on explicit and implicit biases, (3) baseline social connectedness, including loneliness and belonging and (4) the intervention's impact on social connectedness. The statistical tests employed include multiple regression, paired samples t-tests, and bivariate correlation which examine the influence of demographic factors, prior contact, and intervention effects.

The qualitative results section will explore themes derived from participant interviews, offering insights into the subjective experiences of students with disabilities during the intervention. These themes will provide further understanding of how cooperative video gaming facilitated intergroup interactions, influenced perceptions of bias, and shaped social experiences.

To ensure clarity and continuity, this chapter will reiterate the study's primary research questions:

1) What are the disability-related biases of disability services students?
    a) What are the explicit disability-related biases of disability services students?
    b) What are the implicit disability-related biases of disability services students?
    c) Do demographic features affect the disability-related biases of disability services students?
    d) Does the amount of prior contact with individuals with disabilities affect the disability-related biases of disability services students?
2) What is the effect of a cooperative video game play experience on the disability-related biases of disability services students?
    a) Does a cooperative video game play experience have an effect on the explicit disability-related biases of disability services students?
    b) Does a cooperative video game play experience have an effect on the implicit disability-related biases of disability services students?
    c) Does the effect of a cooperative video game play experience on disability-related biases vary based on the amount of prior contact with individuals with disabilities?
    d) Does a cooperative video game play experience have an effect on the disability-related biases of disability services students while controlling for covariates such as demographic features?
3) What are the levels of social connectedness among students with disabilities?
    a) What are the subjective feelings of loneliness among students with disabilities?

b) What are the subjective feelings of belonging among students with disabilities?

4) How does cooperative video game play influence the subjective social experiences of students with disabilities?
    a) Does a cooperative video game play experience have an effect on the subjective feelings of loneliness among students with disabilities?
    b) Does a cooperative video game play experience have an effect on the subjective feelings of belonging among students with disabilities?

The findings presented in this chapter serve as the foundation for the subsequent Discussion chapter, where the implications of these results will be explored in relation to Allport's Intergroup Contact Theory, existing literature, and potential applications in educational and professional settings. The following section details the quantitative results, beginning with sample characteristics and descriptive statistics.

4.2: Quantitative Results

Descriptive Statistics

This section presents an overview of the sample characteristics and key descriptive statistics for the sample. A summary of the demographic variables, including participants' age, gender, race/ethnicity, and disability composition is provided.

Demographic Characteristics of the SWD Group. The sample of individuals identifying as Students with Disabilities (SWD) exhibited diverse demographic characteristics. This section presents an overview of their age distribution, gender representation, racial/ethnic composition, and disability composition (Table 2). These factors are considered relevant to later analyses of social connectedness and belongingness.

Table 2

SWD Demographics

	N	*%*
Gender		
Male	1	11.1
Female	5	55.6
Agender	1	11.1
Nonbinary/Third-gender	2	22.2
Age: *M (SD)*	24.2 (4.918)	
Race		
White	3	33.3
Asian	3	33.3
Black or African American	1	11.1
Biracial	2	22.2
Disability Type		
Autism	3	33.3
Attention deficit	6	66.6
Mental health condition	6	66.6
Health-related disability	3	33.3
Mobility-related disability	3	33.3
Learning disability	2	22.2
Other	2	22.2

Note. This table summarizes demographic characteristics for participants in the Students with Disabilities (SWD) group. Percentages may exceed 100% within the Disability Type category due to participants selecting multiple disability identities. SD = standard deviation.

Age Distribution. The average age of participants in the SWD group was 24.2 years (SD = 4.92), with an age range spanning 14 years. This distribution suggests a moderate level of variability within the group, encompassing individuals at different stages of their academic and professional journeys. The skewness value of 0.49 indicates a slight positive skew, meaning that while the distribution is considered normal (Hair et al., 2022), there are a few participants on the older end of the age range that slightly pull the mean upward. The kurtosis value of -0.58 suggests a somewhat flatter distribution, indicating that age values are more evenly spread without extreme outliers. The relatively broad age range and mild positive skew may introduce diversity in lived experiences, which could influence participants' perceptions of social belonging and engagement with the intervention.

Gender Breakdown. Gender representation within the SWD sample was predominantly female (n = 5; 55.6%), but the group also included individuals identifying as agender (n = 1; 11.1%), non-binary/Third gender (n= 2; 22.2%), and male (n= 1; 11.1%). This distribution illustrates the diverse identities represented in the study and provides a snapshot of gender variation within the participant group.

Racial/Ethnic Composition. The racial and ethnic composition of the SWD group was notably diverse. Asian and White participants each comprised the majority of the sample (n = 3; 33.3%), followed by Biracial participants (n = 2; 22.2%) and Black/African American participants (n = 1; 11.1%). This distribution raises important considerations regarding cultural and racial perspectives on disability bias and social inclusion.

Disability Composition. The disability composition of the sample (N = 9) was diverse, with participants endorsing multiple disability categories. The most frequently reported categories were attention deficit and mental health condition, each noted by 6 participants (n = 6;

66.7%). In addition, Autism was reported by 3 participants (33.3%), as were both Health-related disability and Mobility-related disability (33.3% each). Learning disability was endorsed by 2 participants (22.2%). Furthermore, one participant (11.1%) reported an “Other” disability characterized as Narcolepsy with cataplexy, and another participant (11.1%) reported an “Other” cluster of conditions that included Tourette's syndrome, obsessive compulsive disorder, depression, and conversion disorder. These findings indicate that the group exhibits a varied and overlapping set of disability experiences. The demographic characteristics outlined above provide essential context for interpreting subsequent findings related to subjective feelings of social inclusion and the intervention’s impact.

Demographic Characteristics of the DSS Group. The sample of Disability Services Students (DSS) exhibited diverse demographic characteristics. This section presents an overview of their age distribution, gender representation, and racial/ethnic composition (Table 3). These factors are considered relevant to later analyses of bias.

Table 3

DSS Demographics

		N	*%*
Gender			
	Male	4	44.4
	Female	5	55.6
Age: *M (SD)*		26 (8.67)	
Race			
	White	3	33.3
	Asian	2	22.2
	Black or African American	2	22.2
	Hispanic or Latinx	1	11.1
	Middle Eastern or North African	1	11.1

Note. This table presents demographic information for participants in the Disability Services Students (DSS) group. Gender and race categories were self-reported. Percentages may not total 100% due to rounding. SD = standard deviation.

Age Distribution. The average age of participants in the DSS group was 26 years (SD = 8.67), with an age range spanning 29 years. This distribution suggests a broad spread in participant ages, indicating that the group includes both younger and more mature students at various stages of their academic careers. The skewness value of 2.47 indicates a strong positive skew, meaning that the age distribution is heavily right-skewed, with a larger concentration of younger participants and a few much older individuals extending the distribution. Additionally, the kurtosis value of 6.69 suggests a highly peaked distribution, meaning that most ages are clustered near the lower end, with a few extreme values significantly increasing the spread.

Therefore, caution shall be taken when interpreting the results of this study given the non-normal distribution of the participant sample.

Gender Breakdown. Gender representation within the DSS sample included 5 female participants (55.6%) and 4 male participants (44.4%). The nearly equal distribution of male and female participants may allow for comparative analyses of gender-related perspectives on disability and social engagement.

Racial/Ethnic Composition. The DSS group was racially diverse, with Asian (22.2%), Black/African American (22.2%), Hispanic or Latinx (11.1%), Middle Eastern or North African (11.1%), and White (33.3%) participants. This distribution reflects representation from multiple racial and ethnic backgrounds, which will be considered in analyses of bias measures.
The demographic characteristics outlined above provide essential context for interpreting subsequent findings related to bias measures and the intervention's impact.

Results for Research Question 1: Baseline Disability-Related Biases

The first research question examined the disability-related biases of disability services students, including both explicit and implicit biases. It was hypothesized that explicit bias toward individuals with disabilities would be low, while implicit bias levels would be low to moderate. Descriptive statistics for explicit and implicit biases, as measured by the Multiple Disability Multidimensional Attitudes Scale (MDMAS) and DA-IAT respectively, are reported. The mean scores and standard deviations are presented, along with skewness and kurtosis values to illustrate general trends in explicit attitudes towards individuals with disabilities (Table 4).

Table 4

Explicit and Implicit Bias Scores (MDMAS and DA-IAT)

Measure	Mean	SD	Range	Skewness	Kurtosis
MDMAS-Anxiety					
Calm	2.07	0.81	2.67	0.67	0.65
Negative Affect	1.70	0.44	1.25	0.74	-0.63
Positive Cognition	2.27	0.69	1.67	0.40	-1.95
Behavioral Avoidance	2.48	1.05	3.00	1.08	-0.03
MDMAS-ASD					
Calm	1.80	0.62	2.00	0.48	-0.54
Negative Affect	2.00	0.72	2.00	0.86	-0.96
Positive Cognition	2.67	0.50	1.67	0.86	0.83
Behavioral Avoidance	1.76	0.40	1.00	-0.39	-1.38
DA-IAT	-3.22	5.95	17.69	1.05	0.36

Note. MDMAS = Multiple Disability Multidimensional Attitude Scale, validated across multiple disability vignettes (Park et al., 2023). DA-IAT = Disability Attitude Implicit Association Test, validated in a large rehabilitation student sample (Pruett & Chan, 2006). MDMAS scores are reported as averages of each subscale such that the range is between 1 and 5. For MDMAS subscales, higher scores on Calm or Positive Cognition indicate more favorable attitudes, whereas higher scores on Negative Affect or Behavioral Avoidance reflect more negative or avoidant attitudes. DA-IAT scores typically range from about –14 (strong implicit preference for nondisabled individuals) to +7 (strong implicit preference for disabled individuals); negative values indicate a relative favoring of nondisabled people, whereas positive values suggest a relative favoring of people with disabilities.

Explicit Bias (MDMAS - Anxiety). The explicit bias scores for the MDMAS-Anxiety scale were analyzed across four subscales:

Calm. Participants reported an average score of 2.07 (SD = 0.81), with a range of 2.67. The skewness value of 0.67 suggests a moderate positive skew, meaning that slightly more participants had lower Calm scores, with a few participants reporting much higher levels of calmness toward individuals with anxiety. The kurtosis value of 0.65 indicates a moderate peak, suggesting that scores are somewhat concentrated around the mean with fewer extreme values.

Negative Affect. The mean score was 1.70 (SD = 0.44), with a range of 1.25. The skewness value of 0.74 indicates a moderate positive skew, meaning that slightly more participants had lower Negative Affect scores, with a few individuals reporting considerably higher levels of negative emotional responses. The kurtosis value of -0.63 suggests a flatter distribution, indicating a more even spread of responses across the range.

Positive Cognition. The average score was 2.27 (SD = 0.69), with a range of 1.67. The skewness value of 0.40 suggests a relatively symmetrical distribution, indicating that participants' scores were fairly balanced around the mean. However, the kurtosis value of -1.95 indicates a very flat distribution, meaning that scores were widely dispersed with fewer participants clustering near the mean.

Behavioral Avoidance. Participants scored an average of 2.48 (SD = 1.05), with scores spanning a range of 3.00. The skewness value of 1.08 suggests a stronger positive skew, meaning that while most participants reported moderate avoidance, a few individuals exhibited particularly high levels of avoidance behaviors. The kurtosis value of -0.03 suggests a relatively normal distribution, indicating that scores were spread out without significant clustering or extreme outliers.

Explicit Bias (MDMAS - ASD). The explicit bias scores for the MDMAS-ASD scale were analyzed across four subscales:

Calm. The mean score was 1.80 (SD = 0.62), with scores ranging across 2.00 points. The skewness value of 0.48 suggests a mild positive skew, meaning that slightly more participants reported lower Calm scores, while a few individuals reported particularly high calmness toward individuals with ASD. The kurtosis value of -0.54 suggests a slightly flattened distribution, indicating that scores were more evenly spread rather than clustering around the mean.

Negative Affect. Participants had an average score of 2.00 (SD = 0.72), with a range of 2.00. The skewness value of 0.86 indicates a moderate positive skew, meaning that while most participants had moderate levels of Negative Affect, a subset of individuals exhibited notably stronger negative emotional responses toward individuals with ASD. The kurtosis value of -0.96 suggests a flatter distribution, meaning that Negative Affect scores were more widely dispersed without a strong concentration near the mean.

Positive Cognition. The mean score was 2.67 (SD = 0.50), with a range of 1.67. The skewness value of 0.86 suggests a moderate positive skew, meaning that while most participants had moderate levels of Positive Cognition, a subset reported stronger positive associations toward individuals with ASD. The kurtosis value of 0.83 suggests a somewhat peaked distribution, meaning that scores were more clustered near the mean, with fewer extreme values.

Behavioral Avoidance. The average score was 1.76 (SD = 0.40), spanning a range of 1.00. The skewness value of -0.39 suggests a mild negative skew, meaning that slightly more participants reported higher Behavioral Avoidance scores, with fewer individuals reporting lower levels of avoidance toward individuals with ASD. The kurtosis value of -1.38 suggests a very flat

distribution, indicating that scores were widely dispersed across the range rather than clustering around a central value.

Implicit Biases (DA-IAT). Implicit biases, measured using the Disability Attitude Implicit Association Test (DA-IAT), were analyzed to assess participants' unconscious associations toward individuals with disabilities.

One extreme outlier was identified, with a DA-IAT score more than two standard deviations above the mean, significantly inflating the variability in the data. To ensure a more accurate representation of implicit bias levels and maintain statistical assumptions, this data point was excluded from all subsequent analyses (Hair et al., 2022). This exclusion was conducted following best practices in handling outliers, where extreme values that significantly distort statistical assumptions and influence model outcomes are removed to enhance the accuracy and reliability of the results.

Following this adjustment, the mean implicit bias score was -3.22 (SD = 5.95), with a range of 17.69. The skewness value of 1.05 suggests a moderate positive skew, indicating that while most participants had scores near zero or negative, a subset exhibited notably higher implicit bias scores, pulling the distribution toward the positive end. The kurtosis value of 0.36 suggests a fairly normal distribution, indicating that scores were more evenly spread without excessive clustering or extreme values.

These results indicate that explicit bias scores varied across subscales, while implicit bias scores showed moderate positive skewness. The hypothesis predicting low explicit bias and low-to-moderate implicit bias was partially supported. Further interpretation of these findings will be discussed in Chapter 5.

Influence of Demographic Factors on Biases

The first research question also sought to examine the impact of demographics on the biases of disability services students. We predicted that certain demographic features would significantly affect the disability-related biases of disability services students. In particular, we hypothesize that female students and nonwhite students will exhibit lower disability-related bias than male or white students. A multiple regression analysis was conducted to examine the impact of demographic variables (age, gender, and race/ethnicity) on explicit and implicit bias scores. Results will indicate whether specific demographic features predict levels of disability-related bias.

MDMAS-Anxiety Subscales. A series of multiple linear regression analyses were conducted to examine the impact of Age, Gender, and Race on explicit bias toward individuals with anxiety, as measured by the MDMAS-Anxiety subscales: Calm, Negative Affect, Positive Cognition, and Behavioral Avoidance (Table 5).

Table 5

Regression Models, Coefficients, and Significance for MDMAS-Anxiety Subscales

Model	Variable	β	t	Sig
Calm (R^2 = .33; F = .80; *p* = .54)				
	Age	.09	.71	.51
	Gender (Male)	.47	.25	.81
	Race (Nonwhite)	3.23	1.55	.18
Negative Affect (R^2 = .79; F = 6.30; *p* = .04*)				
	Age	-.17	-3.50	.02*
	Gender (Male)	-.11	-.15	.89
	Race (Nonwhite)	-.318	-3.79	.01*
Positive Cognition (R^2 = .31; F = .74; *p* = .57)				
	Age	.05	.51	.63
	Gender (Male)	1.61	.99	.37
	Race (Nonwhite)	-.17	-.09	.93
Behavioral Avoidance (R^2 = .19; F = .40; *p* = .761)				
	Age	-.23	-.80	.46
	Gender (Male)	-.36	-.08	.94
	Race (Nonwhite)	-4.94	-1.00	.36

Note. R^2 values reflect the proportion of variance explained by each model. β = standardized regression coefficient. Gender was coded as 1 = male, 0 = non-male; Race was coded as 1 = nonwhite, 0 = white. *Indicates a significant value <.05

The influence of demographic factors (age, gender, and race) on explicit biases toward individuals with anxiety was examined using multiple linear regression analyses across four MDMAS-Anxiety subscales: Calm, Negative Affect, Positive Cognition, and Behavioral Avoidance. The regression models accounted for different levels of explained variance across these subscales. The Calm model accounted for 33% of the variance (R^2 = .33, Adjusted R^2 = -0.08, F(3, X) = 0.80, p = .54), while the Negative Affect model explained 79% of the variance (R^2 = .79, Adjusted R^2 = 0.67, F(3, X) = 6.30, p = .04). The model for Positive Cognition

accounted for 31% of the variance ($R^2 = .31$, Adjusted $R^2 = -0.11$, $F(3, X) = 0.74$, $p = .57$), and the Behavioral Avoidance model explained 19% of the variance ($R^2 = .19$, Adjusted $R^2 = -0.29$, $F(3, X) = 0.40$, $p = .76$).

The overall model was statistically significant only for the Negative Affect subscale ($p = .04$), indicating that age and race are associated with negative emotional responses toward individuals with anxiety. The models for Calm, Positive Cognition, and Behavioral Avoidance were not statistically significant, suggesting that demographic factors did not predict these subscale scores.

Regression analyses further examined the individual contributions of Age, Gender, and Race to these subscale scores. Age was a significant predictor of Negative Affect ($\beta = -0.17$, $p = .02$), indicating that older participants reported significantly lower Negative Affect scores, suggesting that negative emotional responses toward individuals with anxiety decreased with age. However, Age was not a significant predictor for Calm, Positive Cognition, or Behavioral Avoidance ($p > .05$), suggesting that calmness, cognitive positivity, and avoidance behaviors were not influenced by age.

Gender (Male) was not a significant predictor in any of the four models ($p > .05$), indicating that explicit bias scores across all subscales did not differ between male and non-male participants. Race (Nonwhite) was a significant predictor of Negative Affect ($\beta = -3.18$, $p = .01$), indicating that nonwhite participants exhibited significantly lower Negative Affect scores than white participants, suggesting reduced negative emotional responses toward individuals with anxiety. However, Race was not a significant predictor for Calm, Positive Cognition, or Behavioral Avoidance ($p > .05$), meaning that explicit calmness, cognitive positivity, and avoidance behaviors did not vary statistically by racial group.

These results partially support the hypothesis. While Race was a significant predictor of bias, with nonwhite participants demonstrating lower Negative Affect toward individuals with anxiety, Gender did not significantly influence bias scores. The implications of these findings will be further explored in the Discussion chapter.

MDMAS-ASD Subscales. A series of multiple linear regression analyses were conducted to examine the impact of Age, Gender, and Race on explicit bias toward individuals with ASD, as measured by the MDMAS-ASD subscales: Calm, Negative Affect, Positive Cognition, and Behavioral Avoidance (Table 6).

Table 6

Regression Coefficients and Significance for MDMAS-ASD Subscales

Model	Variable	β	t	Sig
Calm (R^2 = .07; F = .12; *p* = .95)				
	Age	.01	.10	.92
	Gender (Male)	-.72	-.42	.69
	Race (Nonwhite)	.53	.28	.79
Negative Affect (R^2 = .27; F = .58; *p* = .67)				
	Age	-.13	-.85	.44
	Gender (Male)	2.70	1.17	.29
	Race (Nonwhite)	.31	.12	.91
Positive Cognition (R^2 = .28; F = .65; *p* = .62)				
	Age	.037	.47	.66
	Gender (Male)	-.15	-.13	.90
	Race (Nonwhite)	1.76	1.33	.24
Behavioral Avoidance (R^2 = .11; F = .21; *p* = .89)				
	Age	-.04	-.35	.74
	Gender (Male)	.51	.29	.79
	Race (Nonwhite)	-1.35	-.68	.53

Note. R^2 values reflect the proportion of variance explained by each model. β = standardized regression coefficient. Gender was coded as 1 = male, 0 = non-male; Race was coded as 1 = nonwhite, 0 = white.

The influence of demographic factors (Age, Gender, and Race) on explicit biases toward individuals with ASD was examined using multiple linear regression analyses across four MDMAS-ASD subscales: Calm, Negative Affect, Positive Cognition, and Behavioral Avoidance. The regression models accounted for different levels of explained variance across these subscales. The Calm model accounted for 7% of the variance (R^2 = .07, Adjusted R^2 = -0.50, F(3, X) = 0.12, p = .95), while the Negative Affect model explained 26% of the variance (R^2 = .26, Adjusted R^2 = -0.19, F(3, X) = 0.58, p = .66). The model for Positive Cognition

accounted for 28% of the variance ($R^2 = .28$, Adjusted $R^2 = -0.15$, $F(3, X) = 0.65$, $p = .62$), and the Behavioral Avoidance model explained 11% of the variance ($R^2 = .11$, Adjusted $R^2 = -0.42$, $F(3, X) = 0.21$, $p = .89$).

None of the models were statistically significant ($p > .05$), suggesting that Age, Gender, and Race did not statistically predict explicit biases across any of the four MDMAS-ASD subscales. Regression analyses further examined the individual contributions of Age, Gender, and Race to these subscale scores. Age was not a significant predictor for any subscale ($p > .05$), indicating that explicit calmness, negative emotional responses, cognitive positivity, and avoidance behaviors toward individuals with ASD were not influenced by age.

Gender (Male) was not a significant predictor in any of the four models ($p > .05$), suggesting that explicit bias scores across all subscales did not differ between male and non-male participants. Race (Nonwhite) was also not a significant predictor for any subscale ($p > .05$), indicating that explicit calmness, negative emotional responses, cognitive positivity, and avoidance behaviors toward individuals with ASD did not differ between racial groups.

The hypothesis predicted that demographic characteristics, specifically gender and race, would significantly influence explicit biases toward individuals with ASD. It was expected that female and nonwhite participants would exhibit lower explicit biases compared to male and white participants. However, the results did not support this hypothesis. None of the regression models for the MDMAS-ASD subscales were statistically significant, and Age, Gender, and Race were not significant predictors of explicit bias scores toward individuals with ASD. These findings suggest that demographic factors did not statistically influence explicit biases in this sample.

DA-IAT (Implicit Bias Toward Disabilities). A multiple linear regression analysis was conducted to examine the impact of Age, Gender, and Race on implicit bias toward individuals with disabilities, as measured by the Disability Attitude Implicit Association Test (DA-IAT), excluding an identified outlier (Table 7).

Table 7

Regression Coefficients and Significance for DA-IAT (Implicit Bias)

Model (R^2, p)	Variable	β	t	Sig
DA-IAT (R^2 = .41; F = .91; *p* = .51)				
	Age	-.03	-.15	.89
	Gender (Male)	-3.41	-1.07	.35
	Race (Nonwhite)	2.17	.62	.57

Note. R^2 values reflect the proportion of variance explained by each model. β = standardized regression coefficient. Gender was coded as 1 = male, 0 = non-male; Race was coded as 1 = nonwhite, 0 = white.

The influence of demographic factors (Age, Gender, and Race) on implicit bias toward individuals with disabilities was examined using multiple linear regression analysis with DA-IAT scores as the dependent variable. The regression model accounted for 41% of the variance in DA-IAT scores (R^2 = .41), but after adjusting for the number of predictors, the explanatory power decreased (Adjusted R^2 = -0.04). The overall model was not statistically significant (F(3, X) = 0.91, p = .51), indicating that Age, Gender, and Race did not statistically predict implicit bias toward individuals with disabilities.

Regression analyses further examined the individual contributions of Age, Gender, and Race to implicit bias scores. Age was not a significant predictor (β = -0.03, p = .89), suggesting that implicit bias scores did not change with age. Gender (Male) was also not a significant predictor (β = -3.41, p = .35), indicating that male and non-male participants exhibited similar implicit bias levels. Race (Nonwhite) was not a significant predictor (β = 2.17, p = .57),

suggesting that implicit bias scores did not significantly differ between nonwhite and white participants.

The hypothesis predicted that demographic characteristics, specifically gender and race, would significantly influence implicit biases toward individuals with disabilities, with female and nonwhite participants expected to exhibit lower implicit bias than male and white participants. However, the results did not support this hypothesis. The regression model for DA-IAT scores was not statistically significant, and Age, Gender, and Race were not significant predictors of implicit bias. These findings suggest that demographic factors did not statistically influence implicit biases in this sample.

Influence of Prior Contact on Biases

The first research question also sought to examine the impact of prior contact with individuals with disabilities on the biases of disability services students. We hypothesize that greater prior contact with individuals with disabilities will be associated with lower disability-related biases among disability services students. We expect students who have had frequent or close personal interactions with people with disabilities (for instance, having a family member or close friend with a disability, or significant volunteer/work experience with disabled individuals) to demonstrate more positive attitudes and less implicit bias.

Hierarchical multiple linear regression analyses will assess the relationship between prior contact with individuals with disabilities and explicit/implicit bias scores. This analysis will determine whether greater prior contact is associated with lower levels of bias.

MDMAS-Anxiety Subscales. A series of hierarchical multiple linear regression analyses were conducted to examine whether Prior Contact with individuals with disabilities improved the

prediction of explicit bias toward individuals with anxiety, as measured by the MDMAS-Anxiety subscales: Calm, Negative Affect, Positive Cognition, and Behavioral Avoidance (Table 8).

Table 8

Regression Coefficients and Significance for MDMAS-Anxiety Subscales

Model (R^2, p)	Variable	β	t	Sig
Calm (R^2 = .56; F = 1.27; *p* = .41)				
	Age	.04	.31	.78
	Gender (Male)	-1.18	-.58	.59
	Race (Nonwhite)	4.07	2.07	.11
	Contact	.13	1.46	.22
Negative Affect (R^2 = .79; F = 3.79; *p* = .11)				
	Age	-.17	-2.97	.04*
	Gender (Male)	-.07	-.07	.95
	Race (Nonwhite)	-3.20	-3.27	.03*
	Contact	-.003	-.07	.95
Positive Cognition (R^2 = .33; F = .50; *p* = .743)				
	Age	.07	.56	.61
	Gender (Male)	2.08	.97	.39
	Race (Nonwhite)	-.41	-.20	.85
	Contact	-.04	-.39	.77
Behavioral Avoidance (R^2 = .77; F = 3.25; *p* = .140)				
	Age	-.41	-2.21	.09
	Gender (Male)	-5.94	-1.85	.14
	Race (Nonwhite)	-2.12	-.68	.53
	Contact	.44	3.12	.04*

Note. R^2 values reflect the proportion of variance explained by each model. β = standardized regression coefficient. Gender was coded as 1 = male, 0 = non-male; Race was coded as 1 = nonwhite, 0 = white. Contact = Prior Contact with individuals with disabilities. *Indicates a significant value <.05

The regression models accounted for varying levels of explained variance across the four subscales. The model for Calm explained 56.0% of the variance (R^2 = .56, Adjusted R^2 = .12,

$\Delta R^2 = .23$, $F(4, X) = 1.27$, $p = .41$), while the model for Negative Affect accounted for 79% of the variance ($R^2 = .79$, Adjusted $R^2 = .58$, $\Delta R^2 = .000$, $F(4, X) = 3.79$, $p = .11$). The Positive Cognition model explained 33% of the variance ($R^2 = .33$, Adjusted $R^2 = -0.34$, $\Delta R^2 = .03$, $F(4, X) = 0.50$, $p = .74$), while the Behavioral Avoidance model accounted for 77% of the variance ($R^2 = .77$, Adjusted $R^2 = .53$, $\Delta R^2 = .57$, $F(4, X) = 3.25$, $p = .14$).

Among these models, Prior Contact significantly improved the predictive power of Behavioral Avoidance scores, whereas it did not contribute statistically to Calm, Negative Affect, or Positive Cognition scores. Regression analyses further examined the individual contributions of Prior Contact, Age, Gender, and Race to explicit bias scores toward individuals with anxiety. Prior Contact was a significant predictor of Behavioral Avoidance ($\beta = 0.44$, $p = .04$), indicating that higher Prior Contact scores were associated with greater Behavioral Avoidance toward individuals with anxiety. This suggests that increased prior interactions with individuals with disabilities did not reduce avoidance behaviors as expected. However, Prior Contact was not a significant predictor for Calm, Negative Affect, or Positive Cognition ($p > .05$), meaning that self-reported calmness, negative emotional responses, and cognitive positivity toward individuals with anxiety were not influenced by prior interactions with individuals with disabilities.

Age was a significant predictor of Negative Affect ($\beta = -0.17$, $p = .04$), indicating that older participants exhibited significantly lower Negative Affect scores, suggesting a reduction in negative emotional responses toward individuals with anxiety with increasing age. Additionally, Age was a marginally significant predictor of Behavioral Avoidance ($\beta = -0.41$, $p = .09$), with older participants exhibiting a trend toward lower avoidance behaviors, though this relationship did not reach statistical significance. Age was not a significant predictor for Calm or Positive

Cognition ($p > .05$), suggesting that calm attitudes and positive cognitive associations toward individuals with anxiety remained stable across age groups. Gender was not a significant predictor in any of the models ($p > .05$), indicating that male and non-male participants reported similar explicit bias scores across all subscales.

Race was a significant predictor of Negative Affect ($\beta = -3.20$, $p = .03$), with nonwhite participants exhibiting significantly lower Negative Affect scores compared to white participants, suggesting reduced negative emotional responses toward individuals with anxiety. However, Race was not a significant predictor for Calm, Positive Cognition, or Behavioral Avoidance ($p > .05$), indicating that explicit calmness, cognitive positivity, and avoidance behaviors did not differ between racial groups.

The results did not support our hypothesis. Prior Contact was not a significant predictor of Calm, Negative Affect, or Positive Cognition scores, indicating that self-reported calmness, negative emotional responses, and cognitive positivity toward individuals with anxiety were not statistically influenced by prior interactions with individuals with disabilities. Additionally, higher Prior Contact scores were unexpectedly associated with greater Behavioral Avoidance ($\beta = 0.44$, $p = .04$), suggesting that increased prior interactions did not reduce avoidance behaviors as anticipated. These findings indicate that Prior Contact did not consistently predict lower explicit biases toward individuals with anxiety. The implications of these results will be further explored in the Discussion chapter.

MDMAS-ASD Subscales. A series of hierarchical multiple linear regression analyses were conducted to examine whether Prior Contact with individuals with disabilities improved the prediction of explicit bias toward individuals with ASD, as measured by the MDMAS-ASD subscales: Calm, Negative Affect, Positive Cognition, and Behavioral Avoidance (Table 9).

Table 9

Regression Coefficients and Significance for MDMAS-ASD Subscales

Model (R^2, p)	Variable	β	t	Sig
Calm (R^2 = .33; F = .51; *p* = .74)				
	Age	-.03	-.28	.79
	Gender (Male)	-2.09	-1.09	.34
	Race (Nonwhite)	1.22	.66	.55
	Contact	.11	1.28	.27
Negative Affect (R^2 = .38; F = .61; *p* = .68)				
	Age	-.09	-.52	.63
	Gender (Male)	4.12	1.45	.22
	Race (Nonwhite)	-.41	-.15	.89
	Contact	-.11	-.89	.42
Positive Cognition (R^2 = .42; F = .71; *p* = .63)				
	Age	.89	.15	.89
	Gender (Male)	.56	-.64	.56
	Race (Nonwhite)	.20	1.54	.20
	Contact	.39	.96	.39
Behavioral Avoidance (R^2 = .12; F = .13; *p* = .96)				
	Age	.74	-.36	.74
	Gender (Male)	.91	.12	.91
	Race (Nonwhite)	.62	-.53	.62
	Contact	.87	.18	.87

Note. R^2 values reflect the proportion of variance explained by each model. β = standardized regression coefficient. Gender was coded as 1 = male, 0 = non-male; Race was coded as 1 = nonwhite, 0 = white. Contact = Prior Contact with individuals with disabilities.

The regression models accounted for varying levels of explained variance across the four subscales. The model for Calm explained 34% of the variance (R^2 = .34, Adjusted R^2 = -0.33, ΔR^2 = .27, F(4, X) = 0.51, p = .74), while the model for Negative Affect accounted for 38% of the variance (R^2 = .38, Adjusted R^2 = -0.24, ΔR^2 = .12, F(4, X) = 0.61, p = .68). The Positive Cognition model explained 42% of the variance (R^2 = .42, Adjusted R^2 = -0.17, ΔR^2 = .13, F(4,

X) = 0.71, p = .63), while the Behavioral Avoidance model accounted for 12% of the variance (R^2 = .12, Adjusted R^2 = -0.76, ΔR^2 = .01, F(4, X) = 0.13, p = .96). None of the models were statistically significant (p > .05), suggesting that Prior Contact did not predict explicit bias scores across any of the MDMAS-ASD subscales.

Regression analyses further examined the individual contributions of Prior Contact, Age, Gender, and Race to explicit bias scores toward individuals with ASD. Prior Contact was not a significant predictor in any of the models (p > .05), indicating that self-reported calmness, negative emotional responses, cognitive positivity, and avoidance behaviors toward individuals with ASD were not influenced by prior interactions with individuals with disabilities. Similarly, Age was not a significant predictor in any model (p > .05), suggesting that explicit bias toward individuals with ASD remained stable across different age groups. Gender (Male) was also not a significant predictor (p > .05), indicating that explicit bias scores did not differ between male and non-male participants. Lastly, Race (Nonwhite) was not a significant predictor (p > .05), suggesting that explicit bias toward individuals with ASD did not significantly differ between racial groups.

The results did not support our hypothesis. Prior Contact was not a significant predictor for any of the MDMAS-ASD subscales, indicating that self-reported calmness, negative emotional responses, cognitive positivity, and avoidance behaviors toward individuals with ASD were not statistically influenced by prior interactions with individuals with disabilities. These findings suggest that Prior Contact did not consistently predict lower explicit biases toward individuals with ASD. The implications of these results will be further explored in the Discussion chapter.

DA-IAT (Implicit Bias Toward Disabilities, Minus Outlier). A hierarchical multiple linear regression analysis was conducted to examine whether Prior Contact with individuals with disabilities improved the prediction of implicit bias toward individuals with disabilities, as measured by the Disability Attitude Implicit Association Test (DA-IAT), excluding an identified outlier (Table 10).

Table 10

Regression Coefficients and Significance for DA-IAT

Model (R^2, p)	Variable	β	t	Sig
DA-IAT (R^2 = .25; F = 1.45; *p* = .40)				
	Age	-.19	-.89	.44
	Gender (Male)	-5.68	-1.79	.17
	Race (Nonwhite)	2.93	.95	.41
	Contact	.25	1.50	.23

Note. R^2 values reflect the proportion of variance explained by each model. β = standardized regression coefficient. Gender was coded as 1 = male, 0 = non-male; Race was coded as 1 = nonwhite, 0 = white. Contact = Prior Contact with individuals with disabilities.

The inclusion of Prior Contact in the regression model resulted in a moderate increase in explained variance (ΔR^2 = .25), indicating that Model 2 accounted for 25% more variance in DA-IAT (Implicit Bias) scores than Model 1. The overall variance explained by the full model was 66% (R^2 = .66), but after accounting for the number of predictors, the Adjusted R^2 value of .21 suggests that while the model retained some explanatory power, it remained weak after adjusting for predictor inclusion. The overall model was not statistically significant, F(4, X) = 1.45, p = .40, and the F-change statistic (2.24, p = .23) confirmed that adding Prior Contact did not significantly improve the model's predictive ability.

Regression analyses further examined the individual contributions of Prior Contact, Age, Gender, and Race to implicit bias scores. Prior Contact was not a significant predictor (β = 0.25,

p = .23), indicating that higher Prior Contact scores were weakly associated with increased DA-IAT scores, but this effect did not reach statistical significance. Age was also not a significant predictor (β = -0.19, p = .44), suggesting that older participants exhibited slightly lower implicit bias scores, but this relationship was not meaningful. Similarly, Gender (Male) was not a significant predictor (β = -5.68, p = .17), indicating that male participants had lower implicit bias scores compared to non-male participants, but this effect did not reach statistical significance. Finally, Race (Nonwhite) was also not a significant predictor (β = 2.93, p = .41), suggesting that implicit bias scores did not differ between white and nonwhite participants.

The results did not support our hypothesis. Prior Contact was not a significant predictor of DA-IAT scores, indicating that implicit bias levels were not influenced by prior interactions with individuals with disabilities. Additionally, Age, Gender, and Race were not significant predictors of implicit bias, suggesting that demographic factors did not statistically contribute to variations in DA-IAT scores. These findings indicate that Prior Contact did not consistently predict lower implicit bias toward individuals with disabilities. The implications of these results will be further explored in the Discussion chapter.

Relationship Between Implicit & Explicit Biases

MDMAS-Anxiety and DA-IAT. A series of bivariate correlation analyses were conducted as an exploratory analysis to examine the relationship between implicit bias (DA-IAT) and explicit bias toward individuals with anxiety (Table 11). Given prior research suggesting that implicit and explicit biases may function independently, these analyses assess whether significant associations exist between the two constructs.

Table 11

Summary of Correlation Results for MDMAS-Anxiety

		Calm1	NA1	PC1	BA1	DIAT1
Calm1	Pearson Correlation	1				
	Sig. (2-tailed)					
NA1	Pearson Correlation	-.82*	1			
	Sig. (2-tailed)	0.01				
PC1	Pearson Correlation	-0.15	-0.37	1		
	Sig. (2-tailed)	0.72	0.37			
BA1	Pearson Correlation	0.24	0.16	-0.45	1	
	Sig. (2-tailed)	0.57	0.70	0.27		
DIAT1	Pearson Correlation	0.21	0.08	-0.43	0.09	1
	Sig. (2-tailed)	0.62	0.85	0.29	0.84	

Note. R^2 values reflect the proportion of variance explained by each model. β = standardized regression coefficient. Gender was coded as 1 = male, 0 = non-male; Race was coded as 1 = nonwhite, 0 = white. Contact = Prior Contact with individuals with disabilities. *Indicates a significant value <.05

The correlation analyses revealed a strong and statistically significant negative correlation between Negative Affect (NA1) and Calmness (Calm1) (r = -0.82, p = .01). This indicates that participants who reported higher levels of calmness toward individuals with anxiety were significantly less likely to report experiencing negative emotional responses toward

them. This finding aligns with theoretical expectations, as reduced negative affect should correspond with an increased sense of calmness in interactions with individuals with anxiety.

In contrast, no other significant correlations emerged between the MDMAS-Anxiety subscales and the DA-IAT scores. The relationships between Calm and DA-IAT ($r = 0.21$, $p = .62$), Negative Affect and DA-IAT ($r = 0.08$, $p = .85$), Positive Cognition and DA-IAT ($r = -0.43$, $p = .29$), and Behavioral Avoidance and DA-IAT ($r = 0.09$, $p = .84$) were all non-significant. These results suggest that implicit bias, as measured by the DA-IAT, does not correspond to explicit bias toward individuals with anxiety, reinforcing the idea that these two forms of bias operate independently.

MDMAS-ASD and DA-IAT. A series of bivariate correlation analyses were conducted as an exploratory analysis to examine the relationship between implicit bias (DA-IAT) and explicit bias toward individuals with ASD (Table 12). Given prior research suggesting that implicit and explicit biases may function independently, these analyses assess whether significant associations exist between the two constructs.

Table 12

Summary of Correlation Results for MDMAS-ASD

		Calm1	NA1	PC1	BA1	DIAT1
Calm1	Pearson Correlation	1				
	Sig. (2-tailed)					
NA1	Pearson Correlation	-0.79*	1			
	Sig. (2-tailed)	0.02				
PC1	Pearson Correlation	-0.22	0.21	1		
	Sig. (2-tailed)	0.60	0.63			
BA1	Pearson Correlation	-0.11	0.28	-0.49	1	
	Sig. (2-tailed)	0.80	0.51	0.22		
DIAT1	Pearson Correlation	0.24	-0.29	0.45	-0.73*	1
	Sig. (2-tailed)	0.57	0.49	0.27	0.04	

Note. R^2 values reflect the proportion of variance explained by each model. β = standardized regression coefficient. Gender was coded as 1 = male, 0 = non-male; Race was coded as 1 = nonwhite, 0 = white. Contact = Prior Contact with individuals with disabilities. *Indicates a significant value <.05

The correlation analyses revealed a statistically significant negative correlation between Behavioral Avoidance (BA1) and DA-IAT ($r = -0.73$, $p = .04$). This suggests that participants who demonstrated higher implicit bias against individuals with disabilities (as measured by the DA-IAT) were significantly less likely to report engaging in explicit behavioral avoidance

toward individuals with ASD. While this result is unexpected, it suggests that participants with stronger automatic negative associations toward disability may still consciously report lower levels of avoidance, potentially due to social desirability bias or a disconnect between implicit and explicit measures of bias.

Additionally, a strong negative correlation was found between Calmness (Calm1) and Negative Affect (NA1) ($r = -0.79$, $p = .02$). This indicates that participants who reported higher levels of calmness toward individuals with ASD were significantly less likely to experience negative emotional reactions toward them. This result aligns with previous findings in explicit bias research, which suggest that positive emotional responses toward marginalized groups tend to co-occur with reduced negative affect.

No other correlations between the DA-IAT and explicit bias subscales (Calmness, Negative Affect, or Positive Cognition) were statistically significant. The relationships between DA-IAT and Calmness ($r = 0.24$, $p = .57$), DA-IAT and Negative Affect ($r = -0.29$, $p = .49$), and DA-IAT and Positive Cognition ($r = 0.45$, $p = .27$) were all non-significant, suggesting that implicit and explicit biases toward individuals with ASD do not strongly align.

The exploratory analysis examining the relationship between implicit bias (DA-IAT) and explicit bias (MDMAS-Anxiety and MDMAS-ASD subscales) revealed limited evidence of a strong association between the two constructs. Across both sets of subscales, the correlations between implicit and explicit biases were largely non-significant, reinforcing prior research suggesting that implicit and explicit biases operate independently.

Taken together, these findings suggest that implicit and explicit biases toward individuals with disabilities are distinct constructs that may be influenced by different cognitive and social mechanisms. While explicit biases appear to be internally coherent, they do not strongly predict

implicit biases as measured by the DA-IAT. These results highlight the complexity of bias formation and measurement, suggesting that future research should consider alternative methods for capturing the relationship between implicit and explicit attitudes.

Results for Research Question 2: Effects of Cooperative Video Game Play

This section presents the findings related to the impact of the cooperative video game play intervention on explicit and implicit biases among disability services students. The second research question sought to examine the impact of the cooperative video game sessions with individuals with disabilities on the biases of disability services students. We hypothesize that the following contact experience will significantly lower these levels of bias among disability services students and that these effects will see good retention upon follow-up.

Effect on Explicit Biases (MDMAS). A series of paired t-tests will be conducted to evaluate changes in explicit bias scores from pre-test to post-test and post-test to follow-up. Results will determine whether the intervention led to significant reductions in explicit bias.

MDMAS-Anxiety Subscales. A series of paired t-tests were conducted to evaluate the effects of cooperative video game play on explicit bias toward individuals with anxiety, as measured by the MDMAS-Anxiety subscales: Calm, Negative Affect, Positive Cognition, and Behavioral Avoidance (Table 13). The analyses examined:

1. Change Analysis (Post-test – Pre-test): Did the intervention produce an immediate effect?
2. Retention Analysis (Follow-up – Post-test): Were any observed changes sustained over time?

Table 13

Summary of Statistical Results for MDMAS-Anxiety Subscales

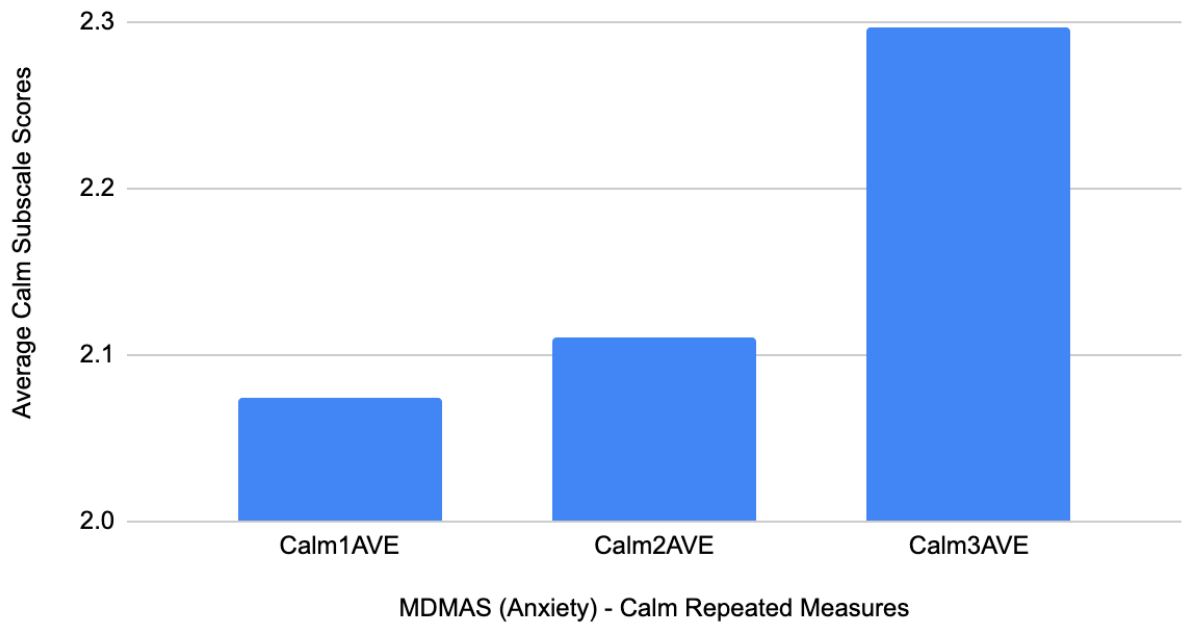
MDMAS-Anxiety Subscale	Mdiff (Post – Pre)	t (df = 8)	p-value (one-tailed)	Effect Size (Cohen's d)	Mdiff (Follow-up – Post)	t (df = 8)	p-value (one-tailed)	Effect Size (Cohen's d)
Calm	0.11	0.24	.41	0.08	0.56	0.89	.20	0.30
Negative Affect	0.00	0.00	.50	0.00	-0.78	-1.08	.16	-0.36
Positive Cognition	1.00	1.73	.06	0.58	0.44	0.77	.23	0.26
Behavioral Avoidance	-1.78	-1.89	.05*	-0.63	-2.22	-1.82	.05	-0.61

Note. Mdiff represent the mean difference between time points: Post-test – Pre-test (Change) and Follow-up – Post-test (Retention). Each paired-samples t-test was conducted with df = 8. Effect sizes are reported using Cohen's d. One-tailed tests were used to evaluate hypothesized directional changes. *Indicates a significant value <.05

The intervention did not significantly increase explicit calmness toward individuals with anxiety at post-test (p = .41) or follow-up (p = .20). While effect sizes were small, they suggested a slight positive trend at follow-up that did not reach statistical significance (Figure 2).

Figure 2

MDMAS-Calm Repeated-Measures Trend

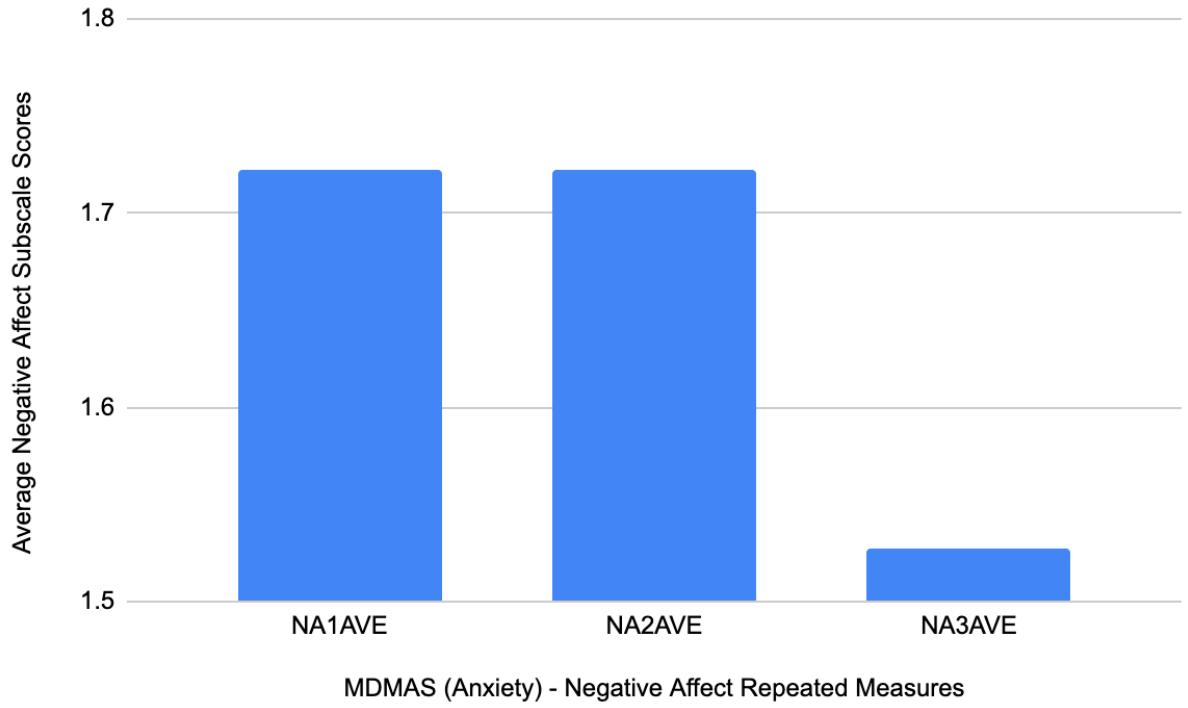


Note. This figure illustrates the average Calm subscale scores from the Multiple Disability Multidimensional Attitudes Scale (MDMAS – Anxiety version) across three time points: pre-test (Calm1AVE), post-test (Calm2AVE), and follow-up (Calm3AVE). Higher scores reflect greater calmness in imagined interactions with individuals with anxiety disorders. The upward trend suggests a positive shift in participant attitudes over time, potentially attributable to the intervention.

There was no measurable change in Negative Affect immediately following the intervention ($p = .50$). However, a small but non-significant reduction was observed at follow-up ($p = .16$), with a small-to-moderate effect size (Cohen's $d = -0.36$), suggesting a potential delayed reduction in negative emotional responses (Figure 3).

Figure 3

MDMAS-Negative Affect Repeated-Measures Trends

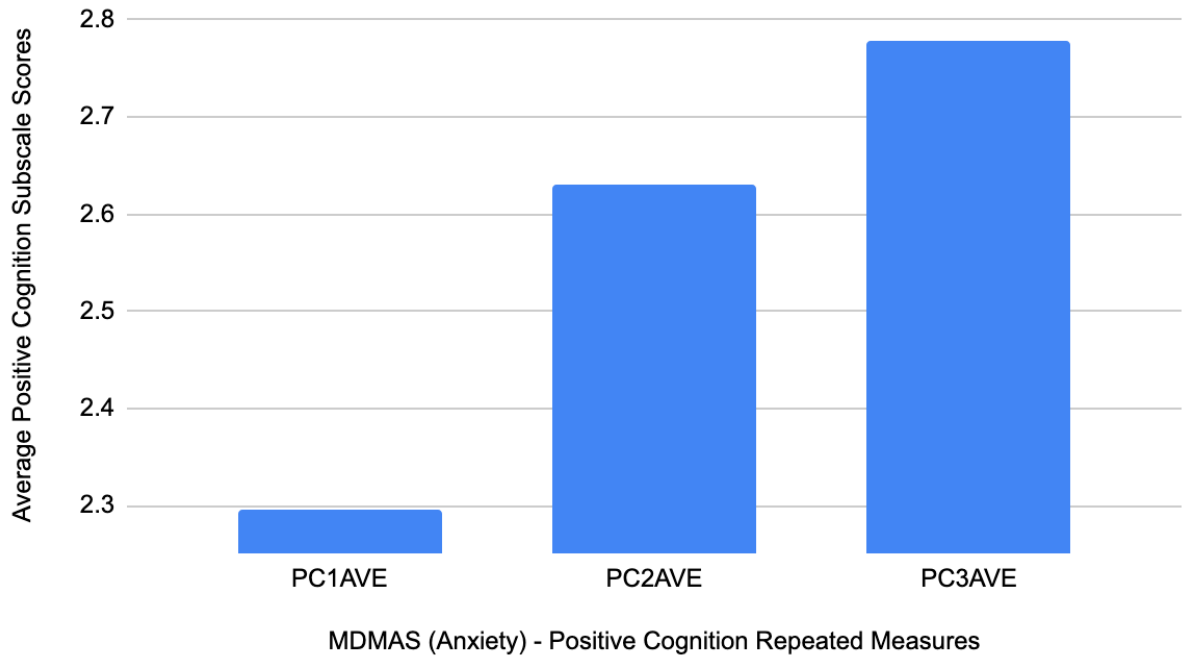


Note. This figure displays the average Negative Affect subscale scores from the Multiple Disability Multidimensional Attitudes Scale (MDMAS – Anxiety version) at three time points: pre-test (NA1AVE), post-test (NA2AVE), and follow-up (NA3AVE). Higher scores indicate stronger negative emotional responses during imagined interactions with individuals with anxiety disorders. The decreasing trend over time—especially the sharp decline at follow-up—suggests a reduction in negative affect, potentially reflecting the sustained impact of the intervention on participants' emotional attitudes.

The intervention approached but did not reach statistical significance for increasing Positive Cognition scores immediately after the intervention ($p = .06$, $d = 0.58$).** At follow-up, the effect size was smaller (Cohen's $d = 0.26$) and no longer significant ($p = .23$), suggesting that some positive cognitive shifts occurred but were not sustained over time (Figure 4).

Figure 4

MDMAS-Positive Cognition Repeated-Measures Trends

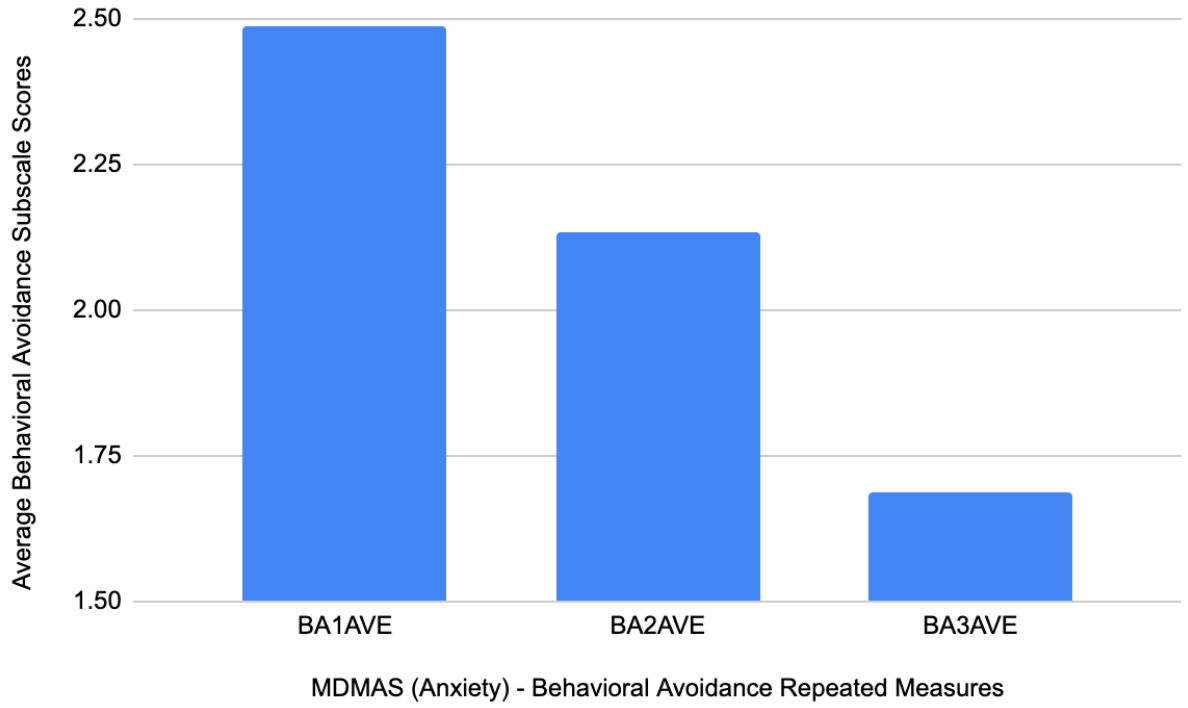


Note. This figure shows the average Positive Cognition subscale scores from the Multiple Disability Multidimensional Attitudes Scale (MDMAS – Anxiety version) across three time points: pre-test (PC1AVE), post-test (PC2AVE), and follow-up (PC3AVE). Higher scores indicate more positive cognitive appraisals toward individuals with anxiety disorders during imagined interactions. The upward trend suggests a progressive increase in positive cognitions, indicating that the intervention may have enhanced participants' perceptions and understanding over time.

The intervention significantly reduced Behavioral Avoidance immediately after the intervention ($p = .05$, $d = -0.63$).** Although the effect persisted at follow-up ($p = .05$, $d = -0.61$), it was just above the threshold for statistical significance (Figure 5). These findings suggest that the intervention was effective in reducing avoidance behaviors, but long-term reinforcement may be needed to sustain the effect.

Figure 5

MDMAS-Behavioral Avoidance Repeated-Measures Trends



Note. This figure presents the average Behavioral Avoidance subscale scores from the Multiple Disability Multidimensional Attitudes Scale (MDMAS – Anxiety version) at pre-test (BA1AVE), post-test (BA2AVE), and follow-up (BA3AVE). Higher scores reflect greater avoidance behavior in imagined interactions with individuals with anxiety disorders. The consistent downward trend suggests a reduction in behavioral avoidance over time, indicating that the intervention may have contributed to increased willingness to engage.

The results partially supported our hypothesis. The intervention did not significantly increase explicit calmness ($p > .05$) or reduce negative affect ($p > .05$) at post-test or follow-up, though a small positive trend was observed for calmness at follow-up and a small-to-moderate reduction in negative affect was seen over time. The intervention approached statistical significance for increasing Positive Cognition immediately after the sessions ($p = .06$, $d = 0.58$), but this effect was not sustained at follow-up ($p = .23$, $d = 0.26$). However, the intervention significantly reduced Behavioral Avoidance at post-test ($p = .05$, $d = -0.63$), with the effect persisting at follow-up but just above the threshold for statistical significance ($p = .05$, $d = -0.61$).

These findings suggest that the cooperative video game intervention was effective in reducing explicit avoidance behaviors toward individuals with anxiety, but did not produce strong or sustained changes in calmness, negative affect, or positive cognition. The implications of these results will be further explored in the Discussion chapter.

MDMAS-ASD Subscales. A series of paired t-tests were conducted to evaluate the effects of cooperative video game play on explicit bias toward individuals with ASD, as measured by the MDMAS-ASD subscales: Calm, Negative Affect, Positive Cognition, and Behavioral Avoidance (Table 14). The analyses examined:

1. Change Analysis (Post-test – Pre-test): Did the intervention produce an immediate effect?
2. Retention Analysis (Follow-up – Post-test): Were any observed changes sustained over time?

Table 14

Summary of Statistical Results for MDMAS-ASD Subscales

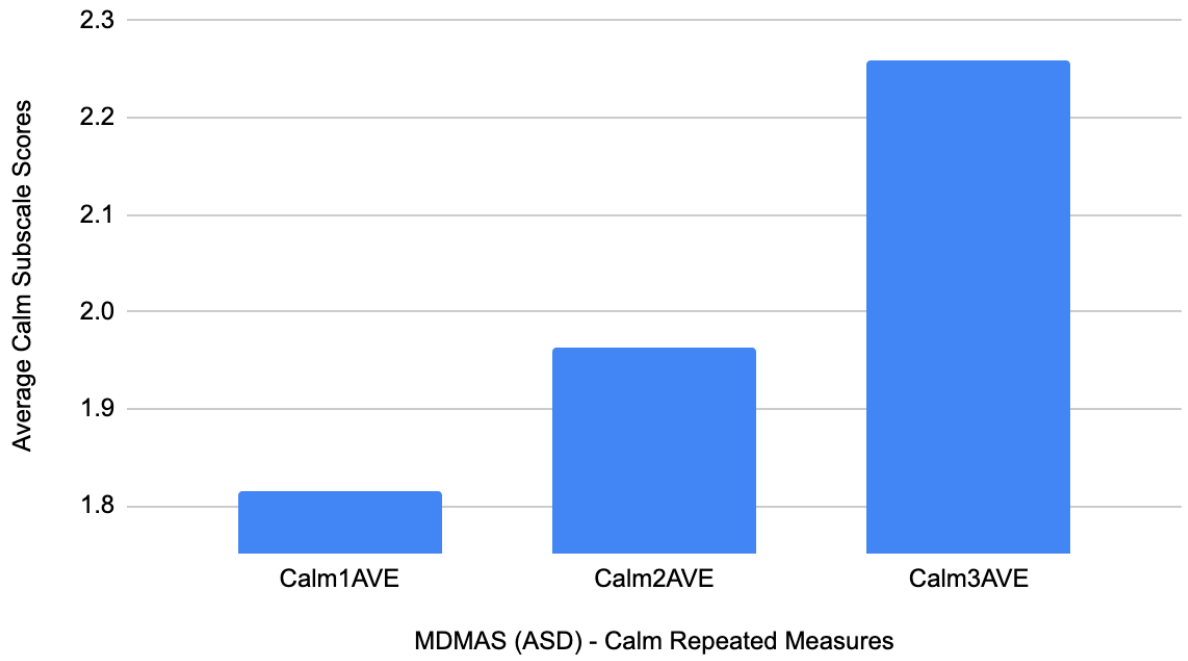
MDMAS-ASD Subscale	Mdiff (Post – Pre)	t (df = 8)	p-value (one-tailed)	Effect Size (Cohen's d)	Mdiff (Follow-up – Post)	t (df = 8)	p-value (one-tailed)	Effect Size (Cohen's d)
Calm	0.44	0.88	.201	0.29	0.89	1.96	.04*	0.65
Negative Affect	-1.89	-3.69	.003*	-1.30	-0.33	-0.76	.24	-0.25
Positive Cognition	0.78	1.67	.066	0.56	-0.67	-1.00	.17	-0.33
Behavioral Avoidance	-0.44	0.74	.241	-0.25	-0.78	-0.94	.19	-0.31

Note. Mdiff represent the mean difference between time points: Post-test – Pre-test (Change) and Follow-up – Post-test (Retention). Each paired-samples t-test was conducted with df = 8. Effect sizes are reported using Cohen's d. One-tailed tests were used to evaluate hypothesized directional changes. *Indicates a significant value <.05

While there was no immediate significant increase in explicit calmness toward individuals with ASD (p = .20), a statistically significant increase was observed at follow-up (p = .04, d = 0.65).** These findings suggest a delayed effect, where participants exhibited greater calmness over time rather than immediately following the intervention (Figure 6).

Figure 6

MDMAS-Calm Repeated-Measures Trends

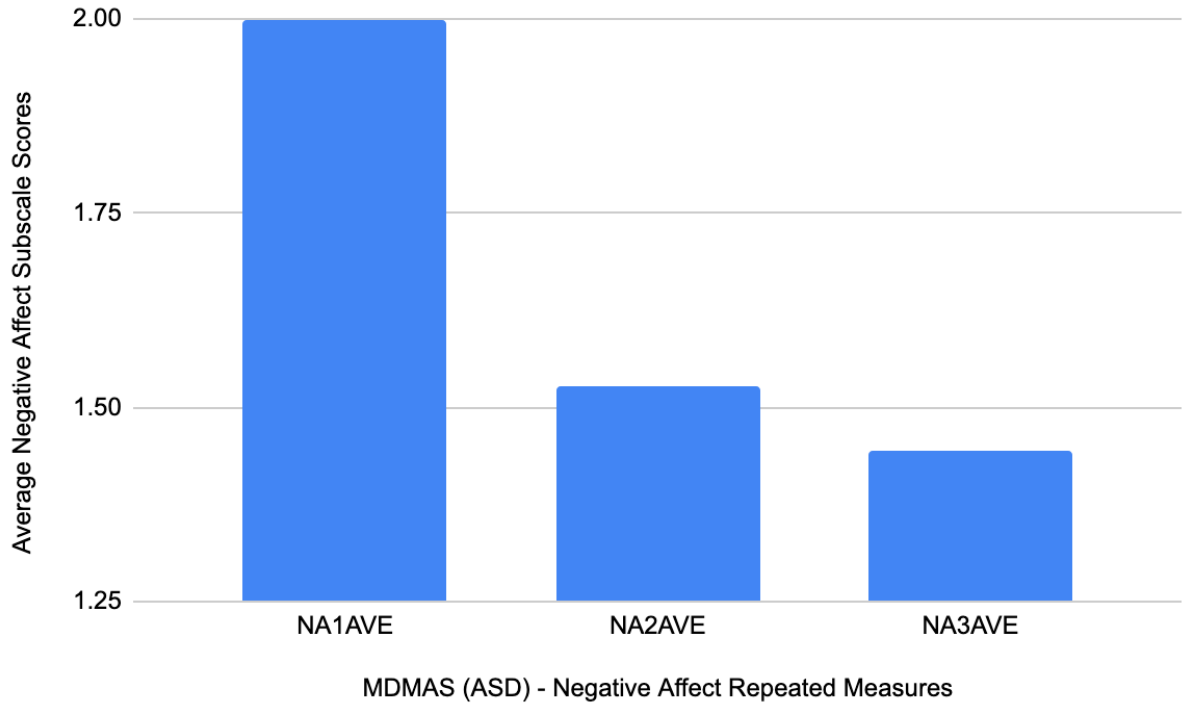


Note. This figure illustrates the average Calm subscale scores from the Multiple Disability Multidimensional Attitudes Scale (MDMAS – Autism Spectrum Disorder version) across three time points: pre-test (Calm1AVE), post-test (Calm2AVE), and follow-up (Calm3AVE). Higher scores reflect greater calmness in imagined interactions with individuals with autism. The upward trend suggests a positive shift in participant attitudes over time, potentially attributable to the intervention.

The intervention significantly reduced Negative Affect toward individuals with ASD immediately after the intervention ($p = .003$, $d = -1.30$), indicating a large effect size. However, this reduction was not fully maintained at follow-up, with the effect size decreasing to a small magnitude ($p = .24$, $d = -0.25$), suggesting that the reduction in negative emotional responses may diminish over time without reinforcement (Figure 7).

Figure 7

MDMAS-Negative Affect Repeated-Measures Trends

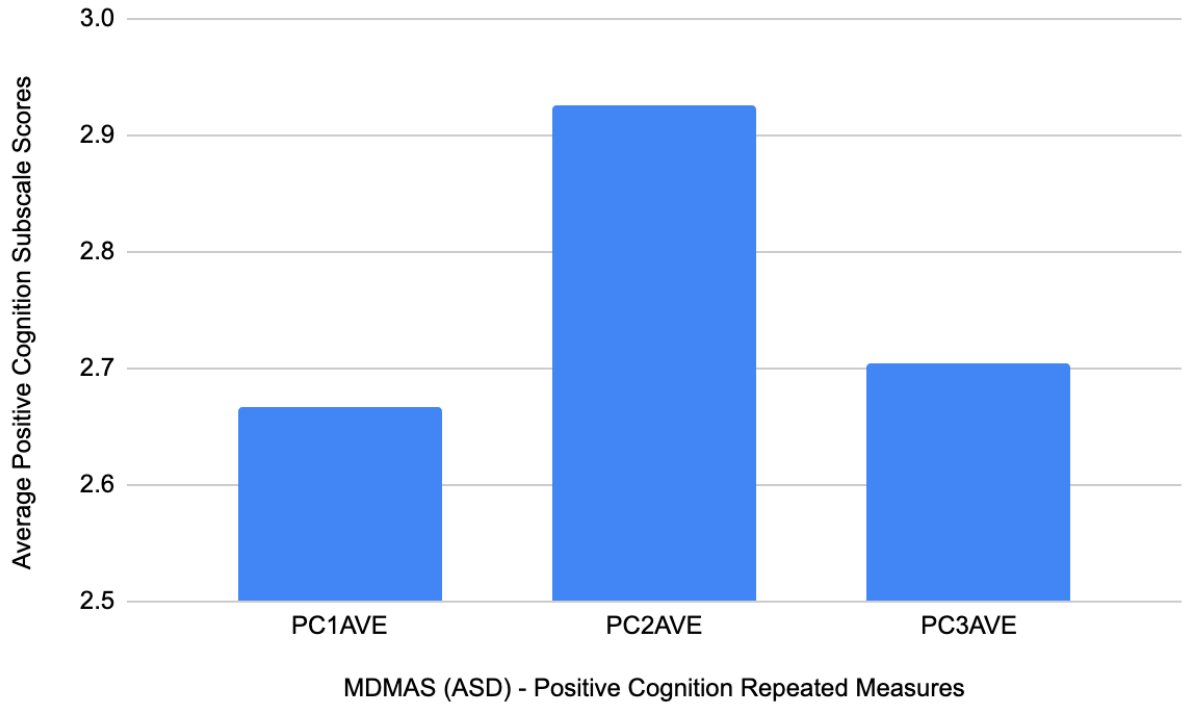


Note. This figure displays average Negative Affect subscale scores from the Multiple Disability Multidimensional Attitudes Scale (MDMAS – Autism Spectrum Disorder version) across pre-test (NA1AVE), post-test (NA2AVE), and follow-up (NA3AVE). Higher scores reflect stronger negative emotional reactions during imagined interactions with individuals on the autism spectrum. The marked decrease over time suggests a notable reduction in negative affect, indicating that the intervention may have had a positive emotional impact on participants' attitudes toward autistic individuals.

The intervention approached but did not reach statistical significance for increasing Positive Cognition immediately after the intervention ($p = .07$, $d = 0.56$). However, at follow-up, Positive Cognition scores declined slightly ($p = .17$, $d = -0.33$), suggesting that some positive cognitive effects were present initially but not sustained over time (Figure 8).

Figure 8

MDMAS-Positive Cognition Repeated-Measures Trends

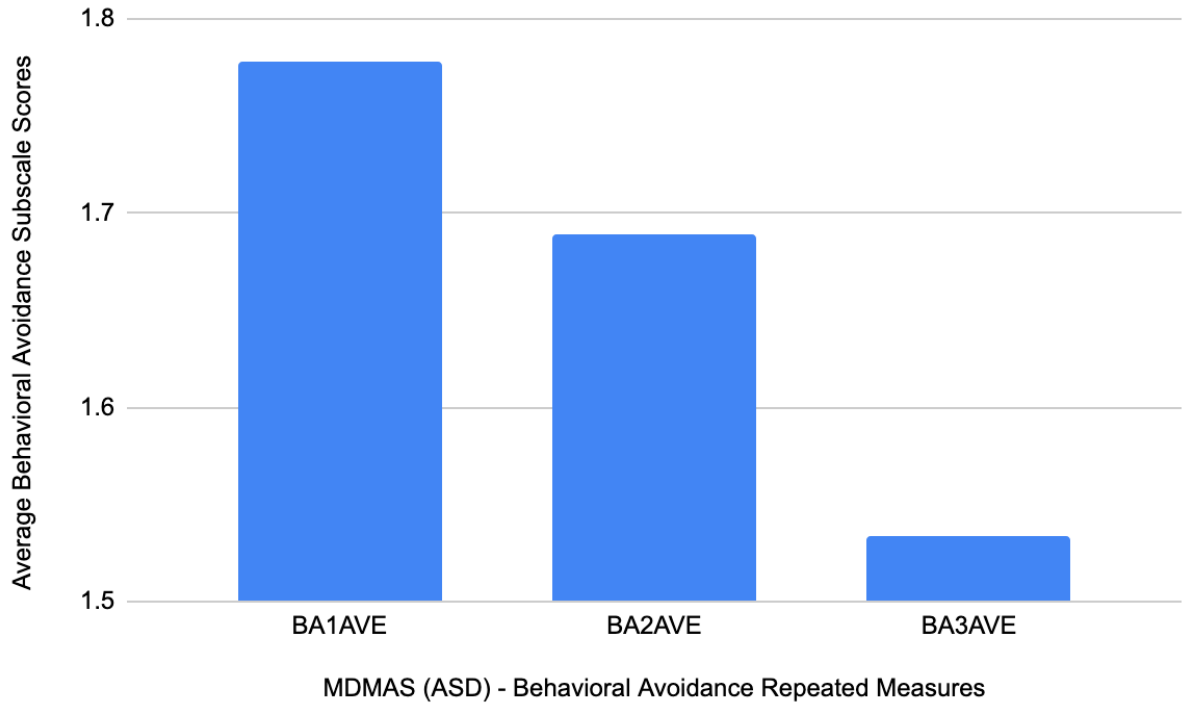


Note. This figure presents average Positive Cognition subscale scores from the Multiple Disability Multidimensional Attitudes Scale (MDMAS – Autism Spectrum Disorder version) at pre-test (PC1AVE), post-test (PC2AVE), and follow-up (PC3AVE). Higher scores indicate more positive cognitive appraisals toward individuals on the autism spectrum. While scores increased following the intervention, a slight decline at follow-up suggests that initial gains in positive cognition may have diminished over time, highlighting the potential need for reinforcement to sustain attitudinal change.

The intervention did not significantly reduce Behavioral Avoidance at post-test or follow-up ($p > .05$). While a small trend toward reduced avoidance was observed, the effect sizes remained small to moderate, indicating that cooperative video game play alone may not be sufficient to reduce avoidance behaviors toward individuals with ASD (Figure 9).

Figure 9

MDMAS-Behavioral Avoidance Repeated-Measures Trends



Note. This figure shows average Behavioral Avoidance subscale scores from the Multiple Disability Multidimensional Attitudes Scale (MDMAS – Autism Spectrum Disorder version) across pre-test (BA1AVE), post-test (BA2AVE), and follow-up (BA3AVE). Higher scores reflect greater behavioral avoidance in imagined interactions with autistic individuals. The consistent downward trend suggests a progressive reduction in avoidance behavior, indicating that the intervention may have contributed to increased comfort and approachability over time.

The results partially supported our hypothesis. While there was no immediate significant increase in explicit calmness ($p = .20$), a statistically significant increase was observed at follow-up ($p = .04$, $d = 0.65$), suggesting a delayed effect where participants exhibited greater calmness over time rather than immediately after the intervention. The intervention significantly reduced Negative Affect toward individuals with ASD immediately after the intervention ($p = .003$, $d = -$

1.30), indicating a large effect size. However, this reduction was not fully maintained at follow-up ($p = .24$, $d = -0.25$), suggesting that the reduction in negative emotional responses may diminish over time without reinforcement.

The intervention approached but did not reach statistical significance for increasing Positive Cognition immediately after the intervention ($p = .07$, $d = 0.56$), and at follow-up, Positive Cognition scores declined slightly ($p = .17$, $d = -0.33$), suggesting that some positive cognitive effects were present initially but were not sustained over time. Additionally, the intervention did not significantly reduce Behavioral Avoidance at post-test or follow-up ($p > .05$), though a small trend toward reduced avoidance was observed. The effect sizes remained small to moderate, indicating that cooperative video game play alone may not be sufficient to reduce avoidance behaviors toward individuals with ASD.

These findings suggest that cooperative video game play may have some positive effects on explicit bias toward individuals with ASD, particularly in increasing calmness and reducing negative affect immediately after the intervention. However, these effects were not always sustained, and the intervention was not effective in significantly reducing avoidance behaviors. The implications of these results will be further explored in the Discussion chapter.

Effect on Implicit Biases (DA-IAT). A series of paired t-tests will analyze changes in implicit bias scores across the study period.

DA-IAT (Implicit Bias Toward Disabilities). A series of paired t-tests were conducted to assess whether cooperative video game play influenced implicit bias toward individuals with disabilities, as measured by the Disability Attitude Implicit Association Test (DA-IAT), excluding an identified outlier (Table 15). The analysis examined:

1. Change Analysis (Post-test – Pre-test): Did the intervention reduce implicit bias?

2. Retention Analysis (Follow-up – Post-test): Were any reductions maintained over time?

Table 15

Summary of Statistical Results for DA-IAT (Implicit Bias)

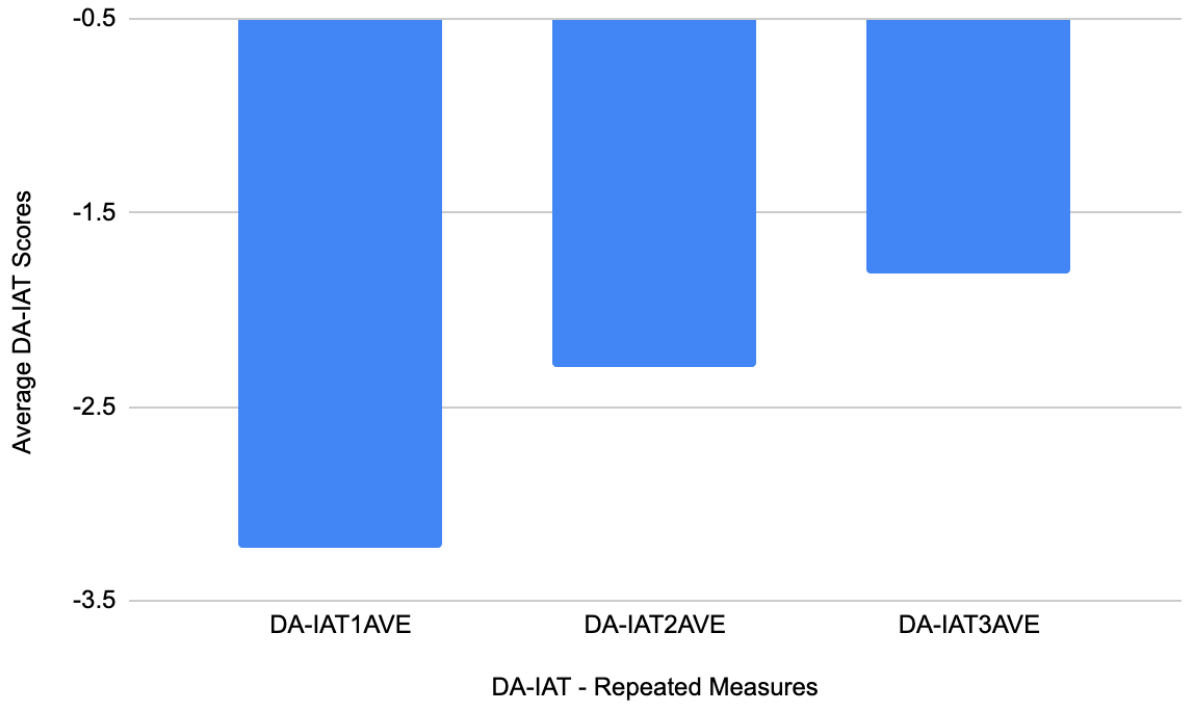
DA-IAT Analysis	Mdiff	SDdiff	t (df = 7)	p-value (one-tailed)	Effect Size (Cohen's d)
Change (Post – Pre)	0.93	9.06	0.29	.39	0.10
Retention (Follow-up – Post)	0.49	5.66	0.24	.41	0.09

Note. Mdiff represent the mean difference between time points: Post-test – Pre-test (Change) and Follow-up – Post-test (Retention). Each paired-samples t-test was conducted with df = 7. Effect sizes are reported using Cohen's d. One-tailed tests were used to evaluate hypothesized directional changes.

The results indicate that the cooperative video game intervention did not lead to a statistically significant reduction in implicit bias toward individuals with disabilities ($p = .39$). The effect size (Cohen's $d = 0.10$) was small, suggesting that the intervention had little to no immediate impact on participants' implicit biases. At follow-up, implicit bias scores remained largely unchanged compared to post-test, with a near-zero mean difference and effect size. The test statistic was not significant ($p = .41$), confirming that the intervention had no lasting effect on implicit bias (Figure 10).

Figure 10

DA-IAT Repeated-Measures Trend



Note. This figure presents average scores from the Disability Attitude Implicit Association Test (DA-IAT) at three time points: pre-test (DA-IAT1AVE), post-test (DA-IAT2AVE), and follow-up (DA-IAT3AVE). DA-IAT scores reflect the strength and direction of implicit biases, with more negative scores indicating a stronger implicit preference for nondisabled individuals over disabled individuals. The upward trend over time suggests a reduction in implicit bias, indicating that the intervention may have positively influenced participants' automatic attitudes toward disability.

The results did not support our hypothesis. The cooperative video game intervention did not lead to a statistically significant reduction in implicit bias toward individuals with disabilities at post-test ($p = .39$), and the effect size was small (Cohen's $d = 0.10$), suggesting little to no immediate impact on participants' implicit biases. At follow-up, implicit bias scores remained

largely unchanged compared to post-test ($p = .41$), with a near-zero mean difference and effect size, confirming that the intervention had no lasting effect on implicit bias.

These findings indicate that the cooperative video game intervention was not effective in reducing implicit biases toward individuals with disabilities. The implications of these results will be further explored in the Discussion chapter.

Omission of Research Question 2c and 2d Analyses

The original research plan included research questions 2c and 2d to examine whether demographic factors (Age, Gender, Race) and prior contact with individuals with disabilities moderated the effects of cooperative video game play on implicit and explicit bias. However, based on the findings from 1c (Influence of Demographics on Biases) and 1d (Influence of Prior Contact on Biases), both demographics and prior contact were found to be non-significant predictors of implicit and explicit bias. Given these results, conducting additional moderation analyses of these factors on the intervention's effects was not justified, as the foundational predictors were already shown to lack explanatory power.

The decision to omit these analyses was based on several considerations. First, demographics and prior contact did not significantly predict bias scores in previous analyses. Across 1c and 1d, none of the demographic variables (Age, Gender, or Race) were significant predictors of implicit or explicit bias, nor did Prior Contact significantly improve the predictive ability of these models. With minimal R^2 changes and no meaningful effects on bias measures, these factors did not contribute significantly to the variance in bias scores, making their inclusion in further analyses unwarranted.

From a statistical and theoretical standpoint, moderation analyses require a significant main effect between the independent and dependent variables, with the potential for an

interaction effect. Since demographics and prior contact did not significantly predict bias scores, testing their interaction with the intervention's effects would lack statistical justification. Conducting additional analyses without theoretical or statistical support increases the risk of Type I errors (false positives) and reduces the interpretability of findings.

In conclusion, the omission of research questions 2c and 2d was based on empirical evidence from 1c and 1d, which demonstrated that demographics and prior contact did not significantly predict bias scores. As a result, conducting additional moderation analyses would not contribute meaningful insights to the study. Instead, the focus remains on the primary intervention effects (2a and 2b), which directly evaluate whether cooperative video game play influenced bias levels. By refining the scope of analysis, this approach maintains statistical rigor, avoids unnecessary testing, and strengthens the clarity of the dissertation's findings.

Results for Research Question 3: Baseline Loneliness and Belonging

The third research question examined the subjective feelings of social inclusion among students with disabilities, including both loneliness and belonging. It was hypothesized that students with disabilities will report elevated feelings of loneliness in the college environment. We anticipate that, on average, students with disabilities will self-report significantly higher loneliness levels reflecting the social marginalization and isolation often documented in prior research. Additionally, we hypothesize that students with disabilities will report lower levels of belonging. We expect that students with disabilities, on average, will feel less connected to and accepted by their campus communities, as reflected in lower self-reported belonging scores or narratives of marginalization.

The UCLA Loneliness Scale and the Belongingness, Engagement, and Self-Confidence (BES) Scale were used to assess participants' levels of social connection, belonging, engagement, and self-confidence (Table 16).

Table 16

Descriptive Statistics for SWD Study Variables

Measure	Mean	SD	Range	Skewness	Kurtosis
UCLA Loneliness Scale	47.70	13.78	40.00	-1.01	0.01
BES - Belonging	3.40	0.47	1.67	-1.43	3.46
BES - Engagement	4.07	0.49	1.67	-0.41	0.58
BES - Self-Confidence	3.43	0.45	1.50	0.60	0.50

Note. The UCLA Loneliness Scale – Version 3 includes 20 items rated on a 4-point Likert scale from 1 (Never) to 4 (Always), with total scores ranging from 20 to 80. Higher scores indicate greater perceived loneliness. The Belonging, Engagement, and Self-confidence (BES) Scale includes 16 items across three subscales: Belongingness (6 items), Engagement (6 items), and Self-confidence (4 items). Each item is rated on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree), with each subscale scored as the mean of its items, resulting in possible values from 1.00 to 5.00. Higher scores indicate stronger perceived belonging, engagement, or self-confidence, respectively.

Loneliness (UCLA Loneliness Scale). Participants had an average score of 47.70 (SD = 13.78), with a range spanning 40 points. The skewness value of -1.01 indicates a moderate negative skew, meaning that more participants reported higher loneliness scores, with fewer individuals scoring on the lower end. The kurtosis value of 0.01 suggests a fairly normal

distribution, indicating that loneliness scores were spread relatively evenly without extreme peaks or flattening.

Belongingness (BES Subscales). The mean belonging score was 3.40 (SD = .047), with a range of 1.67. The skewness value of -1.43 suggests a strong negative skew, meaning that a greater number of participants reported higher belonging scores, with fewer individuals scoring on the lower end. The kurtosis value of 3.46 suggests a highly peaked distribution, meaning that most participants clustered around high belongingness scores, with fewer extreme low values.

With regard to engagement, participants scored an average of 4.07 (SD = 0.49), with a range of 1.67. The skewness value of -0.41 suggests a mild negative skew, meaning that more participants reported slightly higher engagement levels, though scores were relatively balanced. The kurtosis value of 0.58 suggests a moderate peak, indicating that scores were somewhat concentrated near the mean but not excessively so.

The mean self-confidence score was 3.43 (SD = 0.45), with scores spanning 1.50 points. The skewness value of 0.60 suggests a mild positive skew, meaning that more participants reported slightly lower self-confidence levels, with fewer individuals scoring on the higher end. The kurtosis value of 0.50 suggests a somewhat normal distribution, meaning that scores were spread relatively evenly without extreme peaks or flattening.

The results did not fully support our hypothesis. Participants reported a moderate to high level of loneliness (M = 47.7, SD = 13.78), with a moderate negative skew (Skewness = -1.01), indicating that more participants reported higher loneliness scores rather than lower ones. This finding aligns with expectations of elevated loneliness, though the distribution remained fairly normal (Kurtosis = 0.01), suggesting variability in self-reported experiences of loneliness.

Contrary to expectations, students with disabilities did not report lower belonging scores. Instead, the Belonging subscale of the BES (M = 3.40, SD = 0.47) exhibited a strong negative skew (Skewness = -1.43), indicating that a greater number of participants reported higher belonging scores rather than lower ones. The high kurtosis value (Kurtosis = 3.46) suggests that most participants clustered around high belongingness scores, with fewer extreme low values. Similarly, Engagement (M = 4.07, SD = 0.49) and Self-Confidence (M = 3.43, SD = 0.45) scores did not indicate widespread social exclusion, as their distributions remained relatively balanced or slightly skewed toward higher scores.

These results suggest that while loneliness was reported at moderate-to-high levels, students with disabilities also reported a relatively strong sense of belonging, engagement, and self-confidence. The implications of these findings will be further explored in the Discussion chapter.

Results for Research Question 4: Effects on Loneliness and Belonging

This section presents the findings related to the impact of the cooperative video game intervention on loneliness and belonging among students with disabilities. The fourth research question sought to examine the impact of the cooperative video game sessions with disability services students on the subjective feelings of social inclusion, including loneliness and belonging, of students with disabilities. We hypothesize that the contact experience will reduce the subjective feelings of loneliness, and improve feelings of belonging among students with disabilities.

Effect on Loneliness (UCLA Loneliness Scale). A series of paired t-tests assessed changes in loneliness scores from pre-test to post-test and post-test to follow-up.

UCLA Loneliness Scale. A series of paired t-tests were conducted to assess whether cooperative video game play influenced Loneliness levels among students with disabilities (SWD) (Table 17). The analysis examined:

1. Change Analysis (Post-test – Pre-test): Did the intervention reduce loneliness?
2. Retention Analysis (Follow-up – Post-test): Were any reductions maintained over time?

Table 17

Summary of Statistical Results for UCLA Loneliness Scale

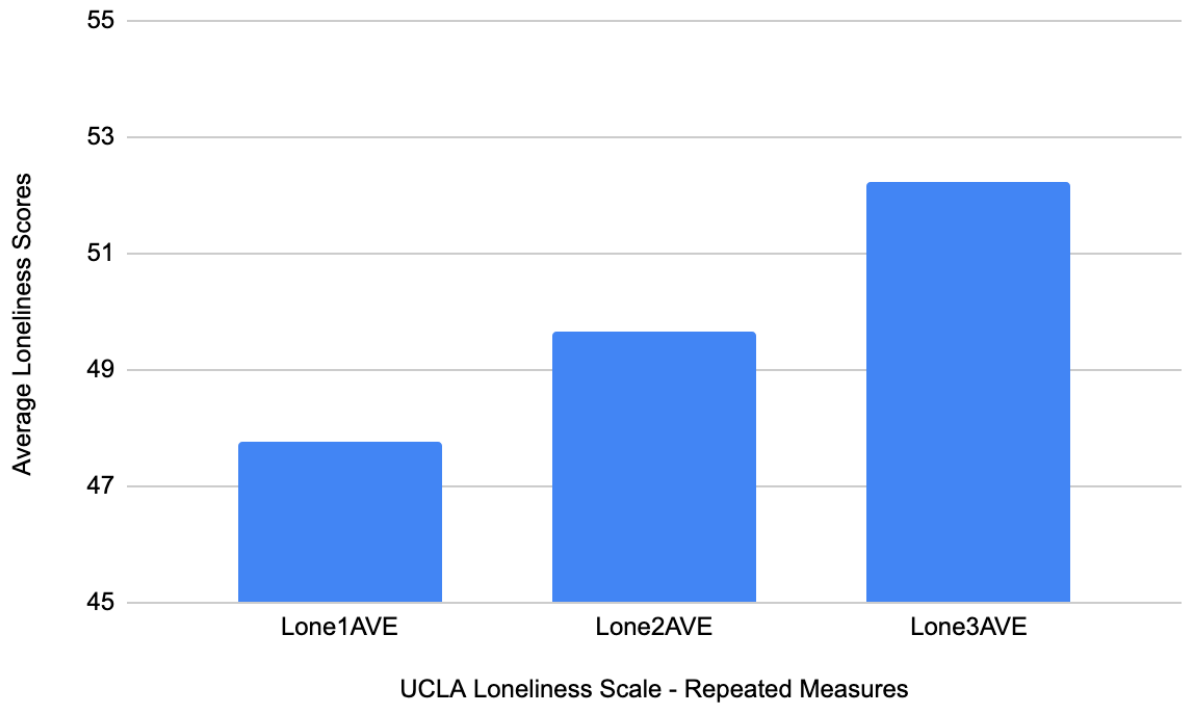
UCLA Loneliness Scale Analysis	Mdiff	SDdiff	t (df = 8)	p-value (one-tailed)	Effect Size (Cohen's d)
Change (Post – Pre)	1.89	7.94	0.71	.25	0.24
Retention (Follow-up – Post)	2.56	7.38	1.04	.17	0.35

Note. Mdiff represent the mean difference between time points: Post-test – Pre-test (Change) and Follow-up – Post-test (Retention). Each paired-samples t-test was conducted with df = 8. Effect sizes are reported using Cohen's d. One-tailed tests were used to evaluate hypothesized directional changes.

The results indicate that Loneliness scores increased following the intervention. However, this increase was not statistically significant (p = .25). The effect size (Cohen's d = 0.24) was small, suggesting a minor trend toward increased loneliness, but one that did not reach meaningful significance. At follow-up, Loneliness scores further increased, with a larger mean difference than the initial change analysis. However, this increase remained non-significant (p = .17). The effect size (Cohen's d = 0.35) was small to moderate, suggesting that while loneliness continued to rise, the effect was not strong or statistically reliable (Figure 11).

Figure 11

Loneliness Repeated-Measures Trends



Note. This figure depicts average scores from the UCLA Loneliness Scale – Version 3 at pre-test (Lone1AVE), post-test (Lone2AVE), and follow-up (Lone3AVE). Scores range from 20 to 80, with higher values indicating greater perceived loneliness. Contrary to expectations, loneliness scores increased over time, suggesting that participants may have become more aware of their social disconnection following the intervention or that external factors unrelated to the intervention may have influenced these outcomes.

The results did not support our hypothesis. Instead of decreasing, Loneliness scores increased following the intervention, though this increase was not statistically significant ($p = .25$). The effect size was small (Cohen's $d = 0.24$), indicating a minor trend toward increased loneliness, but one that did not reach meaningful significance. At follow-up, Loneliness scores continued to rise, with an even larger mean difference than the initial change analysis. However,

this increase also remained non-significant ($p = .17$), and the effect size was small to moderate (Cohen's $d = 0.35$), suggesting that while loneliness continued to increase, the effect was not strong or statistically reliable.

These findings indicate that the cooperative video game intervention did not reduce loneliness among students with disabilities as hypothesized. The implications of these results will be further explored in the Discussion chapter.

Effect on Belonging (BES). A series of paired t-tests analyzed changes in belongingness scores.

Effects of Cooperative Video Game Play on BES Subscales. A series of paired t-tests were conducted to evaluate the effects of cooperative video game play on Belonging, Engagement, and Self-Confidence among students with disabilities (SWD), as measured by the Belonging, Engagement, and Self-Confidence (BES) subscales (Table 18). The analyses examined:

1. Change Analysis (Post-test – Pre-test): Did the intervention produce an immediate effect?
2. Retention Analysis (Follow-up – Post-test): Were any observed changes sustained over time?

Table 18

Summary of Statistical Results for BES Subscales

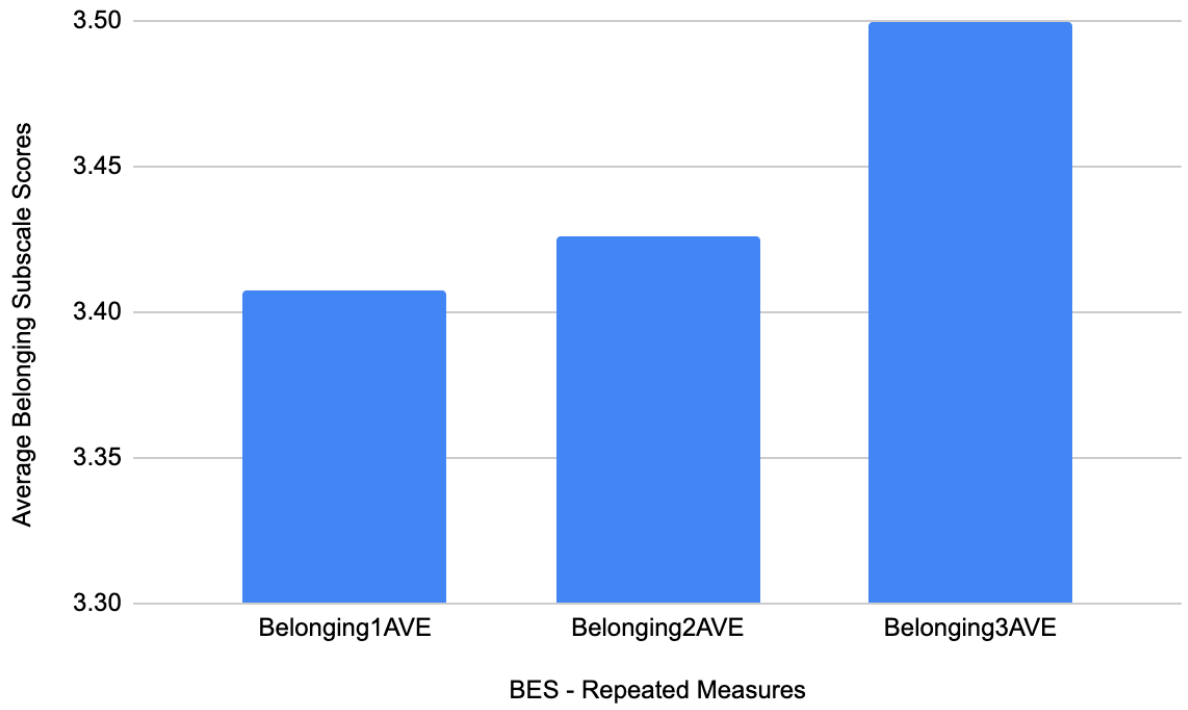
BES Subscale	Mdiff (Post – Pre)	t (df = 8)	p-value (one-tailed)	Effect Size (Cohen's d)	Mdiff (Follow-up – Post)	t (df = 8)	p-value (one-tailed)	Effect Size (Cohen's d)
Belonging	0.11	0.12	.45	0.04	0.44	0.68	.26	0.23
Engagement	0.22	0.33	.38	0.11	-0.89	-2.53	.02*	-0.84
Self-Confidence	0.11	0.20	.42	0.07	-0.67	-1.78	.06	-0.60

Note. Mdiff represent the mean difference between time points: Post-test – Pre-test (Change) and Follow-up – Post-test (Retention). Each paired-samples t-test was conducted with df = 7. Effect sizes are reported using Cohen's d. One-tailed tests were used to evaluate hypothesized directional changes. *Indicates a significant value <.05

The intervention did not significantly increase participants' sense of belonging immediately after the intervention (p = .45) or at follow-up (p = .26). However, a small positive trend was observed at follow-up, as evidenced by a slight increase in effect size (Cohen's d = 0.23), suggesting that potential effects on belonging may develop over time rather than immediately following the intervention (Figure 12).

Figure 12

Belonging Repeated-Measures Trends

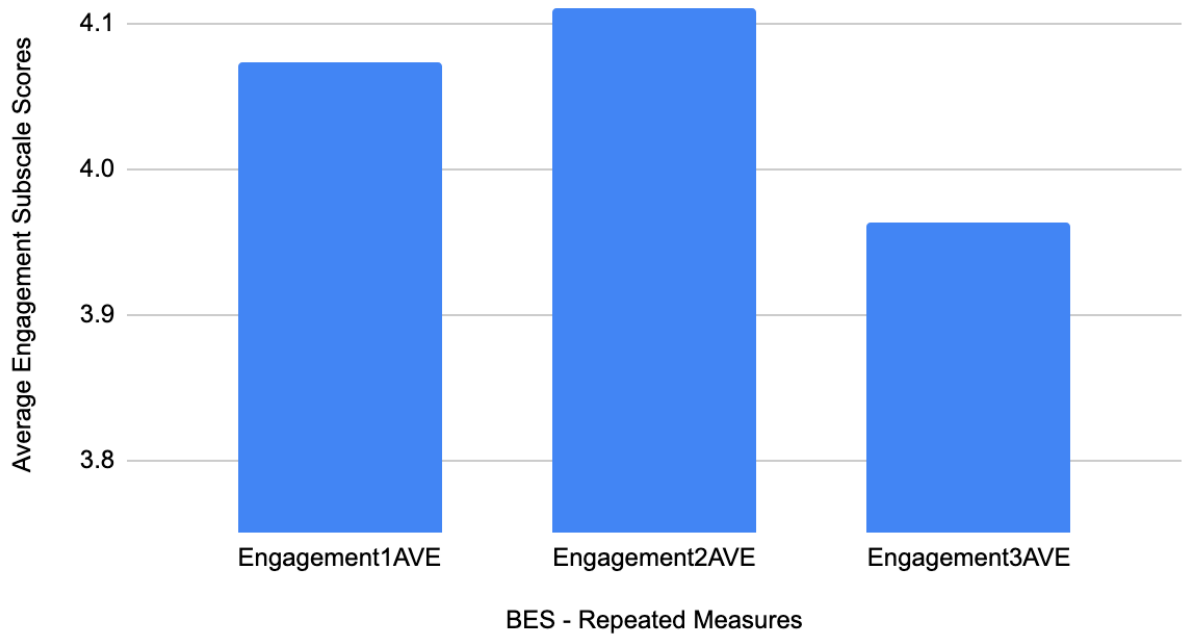


Note. This figure illustrates average Belonging subscale scores from the Belonging, Engagement, and Self-confidence (BES) Scale across pre-test (Belonging1AVE), post-test (Belonging2AVE), and follow-up (Belonging3AVE). Subscale scores range from 1.00 to 5.00, with higher values indicating greater perceived belongingness. The modest but consistent upward trend suggests a gradual increase in participants' sense of belonging over time, potentially reflecting the intervention's positive social and relational effects.

The intervention did not lead to a significant increase in Engagement immediately following the intervention ($p = .38$). However, at follow-up, Engagement scores significantly decreased ($p = .02$, $d = -0.84$), indicating a large effect size and a strong decline in engagement over time. This suggests that any potential engagement benefits from the intervention were not sustained and may have diminished without continued reinforcement (Figure 13).

Figure 13

Engagement Repeated-Measures Trends



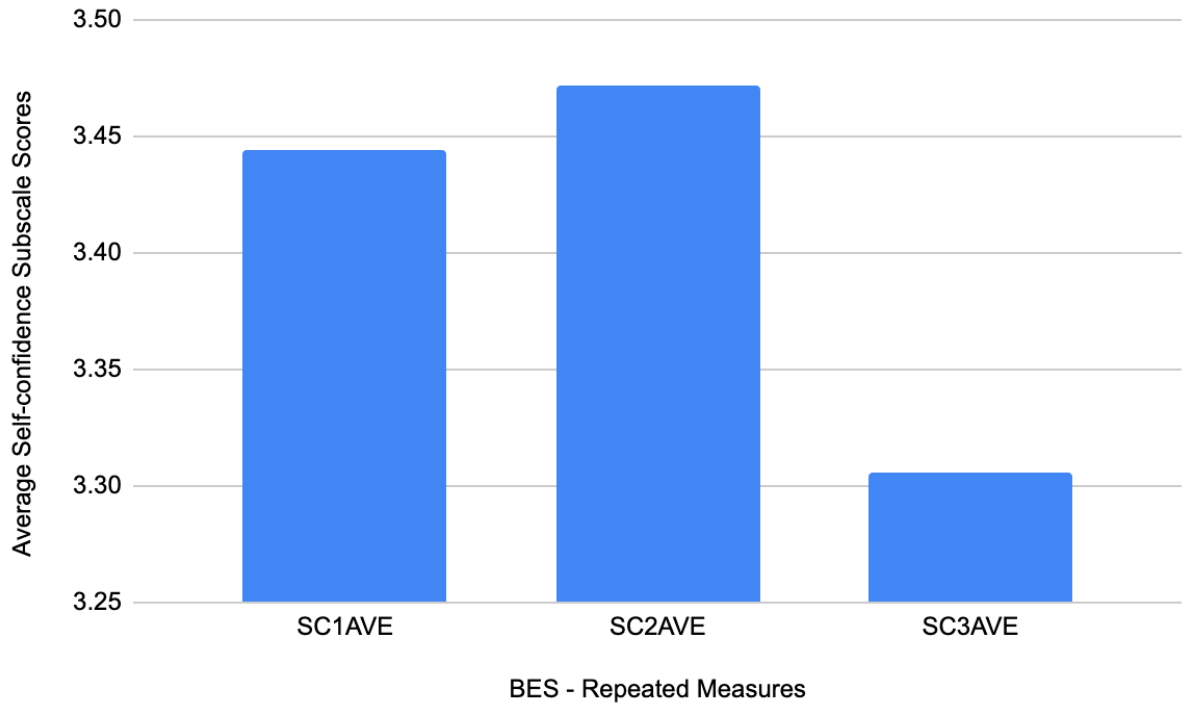
Note. This figure shows average Engagement subscale scores from the Belonging, Engagement, and Self-confidence (BES) Scale at pre-test (Engagement1AVE), post-test (Engagement2AVE), and follow-up (Engagement3AVE). Subscale scores range from 1.00 to 5.00, with higher values indicating greater academic or social engagement. While scores increased immediately following the intervention, a decline at follow-up suggests that initial gains in engagement may not have been sustained, possibly due to contextual or environmental factors after the intervention concluded.

The intervention did not produce a significant increase in Self-Confidence immediately after the intervention ($p = .42$), suggesting that participants' self-efficacy remained largely unchanged post-intervention. At follow-up, Self-Confidence scores declined, approaching

statistical significance (p = .06, d = -0.60), indicating a moderate decrease in self-confidence over time (Figure 14).

Figure 14

Self-Confidence Repeated-Measures Trends



Note. This figure presents average Self-confidence subscale scores from the Belonging, Engagement, and Self-confidence (BES) Scale across pre-test (SC1AVE), post-test (SC2AVE), and follow-up (SC3AVE). Scores range from 1.00 to 5.00, with higher values indicating greater confidence in one's abilities and sense of self-efficacy. Although self-confidence increased following the intervention, the decline at follow-up suggests that gains may not have been maintained over time, potentially highlighting the need for ongoing support or reinforcement strategies.

The results did not support our hypothesis. The intervention did not significantly increase participants' sense of belonging immediately after the intervention (p = .45) or at follow-up (p =

.26). However, a small positive trend was observed at follow-up, as indicated by a slight increase in effect size (Cohen's d = 0.23), suggesting that potential effects on belonging may take time to develop rather than manifest immediately.

For Engagement, the intervention did not lead to a significant increase immediately following the intervention (p = .38). However, Engagement scores significantly decreased at follow-up (p = .02, d = -0.84), indicating a large effect size and a strong decline over time. This suggests that any potential engagement benefits from the intervention were not sustained and may have diminished without continued reinforcement.

For Self-Confidence, the intervention did not produce a significant increase immediately after the intervention (p = .42), suggesting that participants' self-efficacy remained largely unchanged post-intervention. At follow-up, Self-Confidence scores declined, approaching statistical significance (p = .06, d = -0.60), indicating a moderate decrease in self-confidence over time.

These findings indicate that the cooperative video game intervention did not significantly enhance belonging, engagement, or self-confidence among students with disabilities, and in some cases, scores declined over time. The implications of these results will be further explored in the Discussion chapter.

4.3: Qualitative Results

The qualitative portion of this study aimed to explore the appropriateness and feasibility of the intervention while providing additional context to support the quantitative findings regarding loneliness and belonging. Given the exploratory nature of the research, the results are presented as initial categories rather than fully developed themes (Table 19). This approach reflects the limited sample size of five participants and the absence of triangulation in coding or

theme development. The qualitative data offer anecdotal insights into participants' experiences, highlighting aspects of the intervention that contributed to or hindered social inclusion. The following sections outline the emergent categories derived from participants' narratives.

Table 19

Categories and Related Components

Category #	Refined Category	Related Contact Theory Component
1	Cooperative play fosters equality despite real-world differences.	Equal Status
2	Shared goals enhance collaboration and reduce barriers.	Common Goals
3	Game mechanics and encouragement strengthen teamwork.	Cooperation
4	Repeated play builds trust and reshapes perceptions.	Sustained Contact
5	Structured gaming promotes inclusion but has temporary effects.	Social Inclusion
6	Session structure and facilitator support shape experiences.	Structural & Environmental Factors

Note. This table presents broad categories, not finalized themes, as the qualitative data did not reach saturation and lacked triangulation across data sources. Each refined category reflects a generalized participant observation and is mapped onto a corresponding Contact Theory component to contextualize emerging patterns. Interpretations should be considered exploratory and preliminary.

Category 1: Cooperative Play Fosters Equality Despite Real-World Differences

Participants described feeling equal to their partner in gameplay, despite differences in experience, background, or real-world hierarchies. This reflects the principle of equal status in Allport's Contact Theory, which suggests that interactions are most effective when individuals perceive one another as equals. One participant noted, "It felt very equal to me. Within the game, it was easy to decide who wanted to do what, and even outside the game, there was equal status." (H211). Another participant described their initial surprise at collaborating seamlessly with a much older partner, stating, "I was positively surprised that I was able to play with someone twice my age." (A121). Another participant explained that the game's structure allowed them to take on roles naturally without feeling inferior, saying, "We were better at different things, my partner had better dexterity and execution with complex maneuvers. I had maybe more thoughts about what we could try." (Z191). As players adapted to one another's strengths and playstyles, concerns about role imbalances dissipated, reinforcing the equalizing effect of cooperative gameplay.

Category 2: Shared Goals Enhance Collaboration and Reduce Barriers

Having a shared objective was a significant factor in fostering collaboration, demonstrating the importance of common goals in Allport's Contact Theory. Participants reported that goal alignment helped structure their interactions, reducing uncertainty and potential friction. One participant noted, "Having a goal really gave us the impetus to continue working… we had a mutual understanding of 'doing our best.'" (J171). Another described how prioritizing progression over individual achievements helped build a cooperative dynamic, stating, "We came to the consensus that we wanted to progress as much as possible." (H211). Another participant expressed how the shared goal eliminated competition and created a

cooperative atmosphere, saying, “For the most part we seemed to agree that our goal was to get as high a score as possible.” (N161). The structured nature of the task prevented social hesitation and encouraged equal participation, reinforcing teamwork and mutual understanding.

Category 3: Game Mechanics and Encouragement Strengthen Teamwork

Cooperation, a central tenet of Allport’s Contact Theory, was reinforced through structured game mechanics that required players to work together. Participants highlighted how certain mechanics—such as assisting one another with platforming or solving puzzles—created an inherent reliance on their partner. One participant explained, “Standing on each other’s heads encouraged a lot of communication and participation, the colored gates required a lot of strategizing and discussion.” (J171). Another noted how encouragement from their partner helped maintain engagement, stating, “The game mechanics encouraged cooperation, the trampolines, standing on each other’s heads for a boost, or even switching roles when possible.” (H211). Another participant reflected on how the game’s structure made cooperation necessary, stating, “The basics of the game require using the other person; it is so heavily reliant on your partner.” (N161). Communication and patience were key factors in overcoming challenges, fostering an environment where players could effectively support one another.

Category 4: Repeated Play Builds Trust and Reshapes Perceptions

The principle of sustained contact in Allport’s Contact Theory suggests that repeated positive interactions can lead to increased trust and changing perceptions. Participants described how continued gameplay sessions allowed them to develop a rhythm in their teamwork and feel more connected to their partner. One participant shared, “Over time I saw that we would exchange pleasantries and it felt that we were not just limited to talking about the game.” (J171). Another noted how their understanding of their partner evolved, stating, “After talking to her, I

got a better idea of how she thinks, and I knew I could suggest actions she'd agree with." (N161). Another participant described how the familiarity built across sessions helped them strategize more effectively, saying, "By the third session, we could suggest actions in shorthand rather than spelling everything out, which made everything smoother." (Z191). The repeated interactions helped mitigate initial uncertainty and led to more fluid cooperation, reinforcing the impact of sustained contact on relationship-building.

Category 5: Structured Gaming Promotes Inclusion but Has Temporary Effects

This category addresses the research question: How does cooperative video game play influence the subjective social experiences of students with disabilities? Participants reported that the structured gaming environment provided a sense of inclusion and reduced feelings of loneliness during the sessions. One participant stated, "Being able to play with someone in person was great because I don't have many opportunities to play games with others in that way." (N161). Another noted that the sessions fostered a sense of belonging, explaining, "With my disability, not many people have made me feel belonging in many spaces, I did not feel any of that here, I felt like an equal in the study." (J171). However, some participants acknowledged that the positive effects did not always extend beyond the study sessions due to external stressors or pre-existing social barriers. One participant reflected on this, stating, "The moments felt really positive, but an hour later due to depression or other things, I was feeling down." (H211).

Category 6: Session Structure and Facilitator Support Shape Experiences

Participants highlighted the importance of session format, facilitator presence, and environmental consistency in shaping their experience. A structured setting contributed to their comfort, while facilitator guidance helped mitigate frustration and enhance engagement. One participant appreciated the consistent structure, stating, "The study environment, the same

building, the same room, the same controllers, keeping that sense of continuity was big." (N161). Another noted the importance of the facilitator's role, explaining, "Your institutional support, your comments and cheers helped a lot, the slight pivoting prevented a lot of potential frustration." (H211). Several participants expressed a desire for longer or additional sessions, with one stating, "A 4th session, and I would have preferred if the sessions were the same time of day and the same day of the week. That would have drastically improved my experience." (Z191). Another participant noted a minor environmental dimension that improved comfort, stating, "I liked that when we first came in, the game was on and I could listen to the soundtrack; it filled the silence." (A121). The structured environment and consistent facilitation played a critical role in fostering a positive and inclusive experience.

CHAPTER 5: DISCUSSION

5.1: Interpretation of Findings

Interpretation of Research Question 1 (Baseline Biases, Demographics, Prior Contact, Explicit and Implicit Association)

Baseline Explicit Bias (MDMAS - Anxiety). The findings suggest that participants reported moderate levels of cognitive positivity and calmness toward individuals with anxiety-related disabilities while simultaneously exhibiting substantial behavioral avoidance. While some participants demonstrated positive cognitive associations, many still expressed emotional discomfort and avoidance behaviors toward individuals with anxiety.

One possible explanation for this pattern is that individuals may recognize positive qualities in people with anxiety but still feel uncertain about how to interact with them. Anxiety disorders can manifest in ways that make social interactions feel unpredictable or challenging, such as hesitancy in communication, avoidance of eye contact, or difficulty regulating emotions. As a result, participants may consciously endorse positive attitudes toward individuals with anxiety while still preferring to keep social distance due to uncertainty about appropriate social responses.

Another potential factor is personal exposure to anxiety, either through personal experience or interactions with close contacts. Those who have observed or experienced anxiety firsthand may be more likely to acknowledge both its challenges and strengths, reinforcing cognitive positivity while maintaining emotional distance. Conversely, individuals with limited exposure may rely on generalized perceptions or stereotypes, contributing to greater variability in responses.

Overall, these findings suggest that, despite some positive cognitive associations, emotional and behavioral discomfort remains prevalent. This aligns with research indicating that mental health conditions, particularly anxiety disorders, are often met with ambivalent attitudes, where cognitive acceptance coexists with discomfort and avoidance (Feldman & Crandall, 2007). Studies have shown that although individuals with anxiety are not typically viewed as dangerous, they are still subject to social distancing behaviors, likely due to perceptions of unpredictability or difficulty in interaction (Corrigan et al., 2015).

Unlike biases toward anxiety-related disabilities, which appear to be influenced by uncertainty in interaction, biases toward ASD may be shaped by different underlying factors, as explored in the next section.

Baseline Explicit Bias (MDMAS - ASD). Compared to biases toward individuals with anxiety, participants exhibited stronger negative affect toward individuals with ASD, despite also reporting higher levels of positive cognition. This pattern suggests that while participants recognize positive traits in individuals with ASD, they also experience stronger negative emotional reactions, indicating a complex and, at times, conflicting attitude toward this group.

One possible explanation for this pattern is that positive stereotypes about ASD, such as associations with high intelligence or honesty, may not necessarily counteract negative emotional responses (Sasson & Morrison, 2019). While participants may intellectually acknowledge strengths in individuals with ASD, this does not always translate into emotional comfort or ease of interaction. Some individuals may still experience social uncertainty, particularly if they are unfamiliar with autistic communication styles, leading to heightened discomfort or hesitancy in social engagement (Matthews et al., 2015).

Another factor could be that awareness of an ASD diagnosis influences attitudes in different ways. Research suggests that explicit knowledge of a diagnosis can lead to more positive attitudes and reduced negative affect, as it provides a framework for understanding behavioral differences (Howlin, 2021). However, when an individual is unaware of a diagnosis, unfamiliar social behaviors may be misinterpreted as rudeness, disinterest, or noncompliance, potentially increasing negative emotional responses. This may explain why some participants reported both high positive cognition and strong negative affect, reflecting an ambivalent bias toward individuals with ASD.

Although participants reported lower behavioral avoidance toward individuals with ASD compared to those with anxiety, some still exhibited high avoidance tendencies. Unlike avoidance behaviors toward anxiety, which may stem from uncertainty about managing anxious behaviors, avoidance of individuals with ASD may result from difficulty interpreting nontraditional social cues or a lack of familiarity with autistic communication styles (Matthews et al., 2015). This distinction suggests that while both groups experience ambivalent bias, the reasons behind social discomfort and avoidance may differ between anxiety and ASD.

These findings highlight the complexity of explicit biases toward individuals with ASD, where recognition of positive traits does not necessarily reduce emotional discomfort or increase behavioral acceptance. Given this pattern of ambivalent bias, it is important to explore whether these attitudes extend to implicit biases, which are examined in the next section.

Baseline Implicit Bias (DA-IAT). The results reveal considerable variability in implicit biases toward individuals with disabilities. Some participants demonstrated negative implicit bias scores, suggesting more favorable unconscious associations with individuals with disabilities, while others exhibited positive bias scores, indicating stronger implicit biases against this group.

One possible explanation for this heterogeneity is that implicit biases are shaped by a combination of personal experiences, education, and social exposure, leading to individual differences in automatic associations (Wilson & Scior, 2015). Participants with greater exposure to individuals with disabilities in meaningful, positive contexts may have developed weaker implicit biases, whereas those with limited or more negative experiences may still hold deep-seated associations between disability and dependency (Aaberg, 2016).

Another factor could be the disconnect between implicit and explicit attitudes. Some participants may consciously endorse egalitarian views while still holding automatic biases due to long-standing societal narratives that associate disability with helplessness or inferiority. This would explain why implicit biases remain relatively persistent, even in student populations that may be more socially progressive in their explicit attitudes.

A key difference between implicit and explicit biases is that while explicit attitudes toward ASD and anxiety showed ambivalence, implicit bias appears to be less structured and more varied across individuals. This may suggest that implicit biases are influenced less by personal beliefs and more by systemic societal messaging, which may be uniformly absorbed across different demographics.

Overall, these findings highlight the highly heterogeneous nature of implicit biases toward disability. While implicit biases generally favor nondisabled individuals, individual differences in personal experiences and exposure may influence the degree and direction of bias. The role of demographic factors in shaping these biases is explored in the following section.

Demographics and Explicit Bias (MDMAS - Anxiety). Regression analyses indicate that demographic factors significantly influenced Negative Affect toward individuals with

anxiety but did not meaningfully predict Calm, Positive Cognition, or Behavioral Avoidance scores.

Older participants and nonwhite participants exhibited significantly lower Negative Affect scores, suggesting that these demographic factors may be associated with more positive emotional responses toward individuals with anxiety. This aligns with studies suggesting that greater life experience and exposure to mental health challenges may foster greater emotional acceptance (Corrigan et al., 2015). However, self-reported Calm, Positive Cognition, and Behavioral Avoidance scores remained stable across demographic groups, indicating that demographic factors primarily influence emotional reactions rather than cognitive or behavioral attitudes.

One possible explanation for this pattern is that emotional responses are more reactive and shaped by personal experiences, making them more susceptible to individual demographic influences. In contrast, cognitive associations and behavioral tendencies may be influenced by broader societal narratives that remain more stable over time. For example, explicit stereotypes about anxiety disorders—such as whether they reflect personal weakness or a medical condition—tend to be relatively consistent across populations, whereas negative emotional reactions may vary based on cultural norms and personal familiarity with mental health conditions (Corrigan & Watson, 2007; Bradbury, 2020).

Additionally, the lack of demographic influence on behavioral avoidance may suggest that avoidance behaviors are shaped more by situational factors than by demographic background. Individuals may avoid interactions with those experiencing anxiety not because of their demographic characteristics but due to uncertainty about how to respond or discomfort in managing unexpected behaviors.

These findings indicate that demographic factors may shape emotional responses toward individuals with anxiety but have little impact on cognitive and behavioral aspects of explicit bias. Whether this pattern holds for explicit attitudes toward individuals with ASD is explored in the next section.

Demographics and Explicit Bias (MDMAS - ASD). In contrast to explicit biases toward individuals with anxiety, regression analyses indicate that demographic factors did not significantly predict explicit bias toward individuals with ASD across any of the four MDMAS-ASD subscales. The absence of demographic differences in explicit ASD bias aligns with research suggesting that explicit attitudes toward ASD tend to be more stable across age and racial groups than attitudes toward psychiatric conditions (Turnock et al., 2022).

Unlike Negative Affect toward anxiety-related disabilities, which varied by Age and Race, demographic factors did not meaningfully influence Calm, Negative Affect, Positive Cognition, or Behavioral Avoidance toward individuals with ASD. One possible explanation for this consistency is the increasing public awareness and normalization of ASD, which has contributed to relatively stable and generally positive explicit attitudes across demographic groups (Gillespie-Lynch et al., 2015).

Additionally, ASD is frequently conceptualized through a neurodiversity lens, which may result in less variation in explicit stigma based on demographic factors (Zarokanellou et al., 2024). This contrasts with psychiatric conditions, which often evoke strong emotional reactions due to associations with unpredictability or distress. ASD, on the other hand, is increasingly framed as a difference rather than a disorder, which may explain why explicit attitudes remain stable regardless of age, gender, or race.

Another factor to consider is how public discourse frames ASD compared to psychiatric conditions. Conversations around mental health disorders often emphasize emotional distress, which may contribute to demographic differences in emotional responses. In contrast, public messaging about ASD frequently focuses on cognitive strengths, neurodiversity, and the importance of acceptance, potentially leading to greater consistency in explicit attitudes across groups.

The lack of demographic influence on explicit biases toward individuals with ASD contrasts with the patterns observed in anxiety-related biases, suggesting that other factors—such as personal experiences, exposure, and education—may play a more prominent role in shaping explicit attitudes toward ASD. Given this distinction, it is important to assess whether implicit biases toward disability also remain stable across demographic groups, as examined in the next section.

Demographics and Implicit Bias (DA-IAT). Extending the analysis to implicit biases, regression results indicate that demographic factors did not significantly predict DA-IAT scores. The model was not statistically significant, and none of the individual predictors (Age, Gender, or Race) reached significance. This finding is consistent with prior research demonstrating that implicit disability biases are pervasive across demographic groups, with only minor variations based on age, gender, or race (Charlesworth & Banaji, 2019).

While older participants exhibited a slight decrease in implicit bias scores and male participants had marginally lower scores, these relationships were weak and not meaningful. Similarly, Race had no notable impact on implicit bias scores, suggesting that unconscious attitudes toward individuals with disabilities are not significantly shaped by demographic characteristics.

One possible explanation for these findings is that implicit biases tend to develop early in life through repeated social exposure, making them more resistant to demographic influences. Unlike explicit biases, which may be shaped by cultural background, lived experiences, or personal reflection, implicit biases form through automatic associations that are reinforced over time. This would explain why explicit biases toward individuals with anxiety—particularly negative emotional responses—were influenced by demographic characteristics, while implicit biases remained stable across groups.

Another key distinction is that explicit ASD biases and implicit disability biases remain stable for different reasons. Explicit biases toward ASD may be stable due to shifting public discourse and increased awareness, while implicit biases remain stable due to systemic reinforcement and unconscious associations. Unlike explicit attitudes, which can shift through education and self-reflection, implicit biases are less easily disrupted because they operate automatically (Wilson & Scior, 2015).

Additionally, implicit attitudes may be influenced more by systemic societal messaging than by individual demographic traits. Messages about disability—whether in media, education, or social discourse—are often subtle but pervasive, reinforcing unconscious associations that favor nondisabled individuals (Wilson & Scior, 2015). Because these messages are broadly distributed across cultures and communities, they may affect individuals relatively uniformly, resulting in minimal demographic differences in implicit bias scores.

The absence of significant demographic predictors of implicit bias is particularly notable given the observed demographic effects on explicit Negative Affect toward anxiety-related disabilities. These findings align with research suggesting that explicit emotional responses may be shaped by cultural and personal factors, while implicit biases operate independently and are

more resistant to change (Wilson & Scior, 2015). This further reinforces the idea that unconscious biases toward individuals with disabilities are deeply ingrained and not easily altered by demographic characteristics alone (Charlesworth & Banaji, 2019).

Taken together, these findings indicate that while demographic factors may influence explicit emotional responses toward individuals with anxiety, they do not appear to affect explicit biases toward individuals with ASD or implicit biases toward individuals with disabilities in general. This suggests that implicit attitudes may be more resistant to demographic influences, reinforcing the idea that unconscious biases operate independently of self-reported attitudes.

Prior Contact and Explicit Bias (MDMAS - Anxiety). Regression analyses indicate that Prior Contact significantly predicted Behavioral Avoidance scores but did not meaningfully contribute to the prediction of Calm, Negative Affect, or Positive Cognition toward individuals with anxiety. The significant positive relationship between Prior Contact and Behavioral Avoidance suggests an unexpected trend—greater prior contact was associated with increased avoidance behaviors rather than reduced avoidance. This finding challenges the expectation that more contact should reduce avoidance and aligns with research suggesting that the quality and nature of contact, rather than its quantity, determine its effect on bias (Keith et al., 2015).

One possible explanation for this pattern is that prior interactions with individuals with anxiety may have been negative, stressful, or emotionally challenging, reinforcing discomfort rather than reducing it. Studies have shown that when prior interactions are unstructured, superficial, or anxiety-inducing, they can increase avoidance behaviors rather than alleviate them (Tropp et al., 2022). If participants had interactions where they felt uncertain about how to

respond, they may have developed avoidance as a self-protective strategy rather than as a response to negative bias.

Another potential explanation is that familiarity with anxiety-related behaviors may increase recognition of social or emotional difficulties, making these challenges more salient rather than more comfortable. Instead of fostering engagement, greater contact may increase awareness of interaction difficulties, leading to a preference for social disengagement rather than continued exposure.

Beyond Prior Contact, Age and Race were significant predictors of Negative Affect, with older participants and nonwhite participants exhibiting lower Negative Affect scores. These results align with research suggesting that life experience and cultural values may shape emotional responses toward marginalized groups. In contrast, Gender was not a significant predictor, indicating that explicit bias scores did not vary meaningfully between male and non-male participants.

Overall, these findings suggest that demographic factors and Prior Contact together do not strongly predict Calm, Negative Affect, or Positive Cognition toward individuals with anxiety. However, the unexpected relationship between Prior Contact and Behavioral Avoidance highlights the importance of structured interactions in reducing avoidance behaviors. This pattern is consistent with research using the Contact with Disabled Persons (CDP) Scale, which has demonstrated that greater contact does not always reduce prejudice—particularly when interactions are not positive or meaningful (Yuker & Hurley, 1987).

In cases where contact is not designed to challenge stereotypes, individuals may develop avoidance behaviors as a coping mechanism against discomfort (Keith et al., 2015). These findings suggest that simply increasing exposure is not sufficient to reduce avoidance

behaviors—instead, contact must be structured to facilitate positive interactions. Given this unexpected pattern, it is important to explore whether similar trends emerge in biases toward individuals with ASD, as examined in the next section.

Prior Contact and Explicit Bias (MDMAS - ASD). Expanding the analysis to explicit biases toward individuals with ASD, regression results indicate that Prior Contact did not significantly predict any of the MDMAS-ASD subscales. Unlike MDMAS-Anxiety, where Prior Contact significantly predicted Behavioral Avoidance, it did not meaningfully influence Calm, Negative Affect, Positive Cognition, or Behavioral Avoidance toward individuals with ASD. This suggests that explicit attitudes toward individuals with ASD are relatively stable and less influenced by prior interactions.

One possible explanation for this lack of association is that bias toward individuals with ASD is shaped more by cognitive stereotypes than by emotional reactions. Prior research indicates that explicit bias toward ASD is often shaped by education, knowledge, and societal narratives rather than direct interpersonal contact (Nevill & White, 2011). Unlike psychiatric disabilities, where past experiences may evoke emotional discomfort or avoidance behaviors, attitudes toward ASD may be driven more by misconceptions about abilities and social functioning rather than by personal discomfort (Dickter et al., 2020).

Another factor may be that contact with individuals with ASD does not necessarily challenge existing biases in the same way that contact with individuals with psychiatric disabilities might. Because ASD is often framed through a neurodiversity perspective rather than a medical pathology, prior interactions may reinforce existing perceptions rather than prompting attitudinal change. This aligns with studies comparing bias reduction across disability groups,

which suggest that prior contact is more effective in reducing bias toward anxiety-related conditions than ASD-related conditions (Chu et al., 2023).

Similarly, none of the demographic variables (Age, Gender, or Race) significantly predicted explicit bias scores, reinforcing the idea that explicit biases toward individuals with ASD are shaped more by external influences, such as media portrayals and educational experiences, rather than by direct exposure. These findings suggest that interventions designed to improve attitudes toward ASD should focus on education and structured awareness efforts rather than relying on contact alone (Dickter et al., 2020).

These findings contrast with the significant role Prior Contact played in Behavioral Avoidance toward individuals with anxiety. This distinction underscores how biases based on emotional discomfort (such as those toward anxiety) may be more malleable through interpersonal contact, while biases based on cognitive misconceptions (such as those toward ASD) may require targeted educational interventions. Given this distinction, it is important to examine whether prior contact has a stronger influence on implicit biases, which are explored in the next section.

Prior Contact and Implicit Bias (DA-IAT). Extending the analysis to implicit biases, the addition of Prior Contact to the regression model did not significantly enhance the prediction of DA-IAT scores. The model as a whole was not statistically significant, and none of the individual predictors (Age, Gender, Race, or Prior Contact) reached significance. These results support research indicating that implicit biases are more resistant to change through exposure alone (Wilson & Scior, 2015).

One possible explanation for this pattern is that implicit biases are deeply embedded in cultural narratives and social conditioning, making them less responsive to direct experiences or

self-reported contact. While greater contact with individuals with disabilities can reduce explicit prejudice, research has consistently found that it often fails to shift unconscious associations, which remain entrenched in long-term socialization and media portrayals (Murch et al., 2018). Another possible explanation is that prior contact alone does not necessarily challenge deeply ingrained stereotypes unless it is structured to do so. Unlike explicit biases, which may change through repeated interactions and knowledge acquisition, implicit biases require targeted interventions to be meaningfully altered. Research suggests that perspective-taking exercises, counter-stereotypical exposure, and intentional stereotype-challenging interventions are necessary to disrupt automatic associations (Keith et al., 2015).

Taken together, these findings suggest that implicit biases toward individuals with disabilities remain relatively stable across demographic groups and are not substantially affected by prior interactions. This aligns with research demonstrating that while explicit attitudes can become more accepting through contact, implicit biases often remain unchanged, requiring more intentional and sustained efforts to modify (Charlesworth & Banaji, 2019).

Overall, the results indicate that neither demographic factors nor prior contact serve as strong predictors of explicit or implicit biases toward individuals with disabilities. This reinforces the idea that other factors, such as structured intervention strategies or broader societal influences, may play a more substantial role in shaping attitudes. Given the stability of implicit bias across demographic and experiential variables, further investigation into effective intervention methods is necessary to meaningfully shift unconscious attitudes toward disability.

Association Between Explicit Bias and Implicit Bias. The relationship between explicit biases (MDMAS-Anxiety and MDMAS-ASD) and implicit biases (DA-IAT) revealed no strong correlations, reinforcing the idea that explicit and implicit biases function as independent

constructs. These results confirm prior research suggesting that explicit attitudes are shaped by social norms and self-awareness, while implicit biases operate automatically and are influenced by long-term cultural exposure (Frankish, 2010; Nosek, 2005).

For both MDMAS-Anxiety and MDMAS-ASD, a strong inverse correlation was observed between Calmness and Negative Affect, confirming that explicit attitudes were internally coherent. As self-reported calmness increased, negative emotional responses decreased, suggesting that participants' conscious attitudes were logically structured. This is consistent with prior findings that self-reported attitudes tend to be stable within explicit awareness (Nosek, 2005).

However, implicit biases (DA-IAT scores) did not significantly correlate with any of the explicit bias subscales, suggesting that self-reported attitudes do not necessarily predict automatic associations. One explanation for this pattern is that explicit biases are shaped by reflection and social expectations, whereas implicit biases remain entrenched through long-term socialization. Prior research has demonstrated that even individuals who consciously reject prejudice may still exhibit automatic biases due to persistent cultural narratives (Nosek, 2005). Another explanation may be the fundamental difference in how explicit and implicit biases are expressed in behavior. While explicit attitudes can change based on new experiences or deliberate effort, implicit attitudes often require more active, targeted interventions to shift. The lack of correlation between these measures suggests that reducing explicit bias does not necessarily lead to reductions in implicit bias, reinforcing prior research indicating that long-term exposure to counter-stereotypical experiences may be necessary to alter unconscious associations (Keith et al., 2015).

Additionally, while explicit biases are measured through self-report, implicit biases are captured through automatic response tasks, which assess subconscious associations rather than controlled beliefs. This distinction may explain why participants reported low explicit bias yet still exhibited implicit biases, emphasizing the importance of not relying solely on self-reported attitudes to assess bias reduction.

Overall, these findings reinforce the complexity of bias formation and expression, highlighting that reducing explicit bias alone is not enough to ensure changes in automatic biases. This distinction underscores the need for structured interventions that specifically target unconscious associations, rather than relying on self-reported attitude shifts alone.

Interpretation of Research Question 2 (Intervention Effects on Bias)

Effect on Explicit Bias - MDMAS-Anxiety Subscales. The cooperative video game intervention had the strongest effect on reducing Behavioral Avoidance, with moderate to large effect sizes observed at both post-test and follow-up. Studies on cooperative video gameplay suggest that working toward a shared goal in an interactive environment can lower social distance and decrease avoidance behaviors (Adachi et al., 2016). Additionally, research indicates that collaborative activities foster interpersonal comfort, which may explain the observed reduction in Behavioral Avoidance following the intervention (Ferchaud et al., 2020).

One possible reason for this reduction in avoidance is that gameplay provides a structured and goal-oriented setting where social interactions are secondary to task completion. By focusing on shared objectives rather than direct interpersonal engagement, participants may have been able to interact with individuals with anxiety in a way that felt less intimidating or emotionally demanding. This gradual and indirect exposure could have helped normalize interactions and reduce avoidance tendencies over time.

However, the intervention had a weaker impact on cognitive and emotional biases. Positive Cognition showed a moderate increase at post-test, but this effect was not statistically significant and diminished at follow-up. Similarly, Negative Affect showed no immediate change but exhibited a small, non-significant decrease over time, while Calm scores remained largely unchanged.

One possible explanation for these weaker effects is that behavioral shifts do not always translate into changes in cognitive associations or emotional responses. While participants may have become more comfortable interacting in the game environment, this does not necessarily mean they revised their underlying beliefs about individuals with anxiety. Research suggests that structured social interactions alone may not be enough to challenge existing biases, particularly when interventions do not include explicit reflection or discussion components (Stiff & Kedra, 2020).

Additionally, explicit emotional biases (e.g., Negative Affect) are often shaped by broader societal influences and ingrained perceptions, making them more resistant to short-term interventions (Cangas et al., 2017). Participants may have been able to interact in the gaming environment without discomfort, yet still retain deep-seated emotional responses when faced with real-world interactions. Without mechanisms to confront or process these responses, any shifts in emotional bias may have been too subtle to be detected within the study's timeframe.

These findings suggest that while cooperative video game play may be effective in reducing avoidance behaviors, its impact on cognitive associations and emotional responses is less pronounced and may require additional reinforcement mechanisms to sustain long-term changes. Given these mixed results, it is important to assess whether similar patterns emerge in explicit biases toward individuals with ASD.

Effect on Explicit Bias - MDMAS-ASD Subscales. The intervention had the strongest effect on reducing Negative Affect immediately after the intervention, with a large effect size, and on increasing Calmness at follow-up, with a moderate to large effect size. This suggests that cooperative gameplay may be particularly effective in promoting short-term emotional shifts toward individuals with ASD, aligning with research showing that collaborative play fosters positive intergroup emotions (Stiff & Kedra, 2020).

One possible reason for this temporary reduction in Negative Affect is that engagement in cooperative tasks may have helped normalize interactions with individuals with ASD, leading to immediate emotional shifts. Participants may have experienced a greater sense of ease and familiarity during gameplay, reducing discomfort in the short term. The delayed increase in Calmness at follow-up suggests that while initial emotional reactions were influenced by direct gameplay experience, a longer period may have been required for these feelings to become fully integrated into participants' perceptions of individuals with ASD.

However, the reductions in Negative Affect were not fully sustained, and neither Positive Cognition nor Behavioral Avoidance showed significant long-term improvements. This finding is similar to biases toward individuals with anxiety, where short-term exposure reduced immediate discomfort but did not produce lasting shifts in attitudes or avoidance behaviors. Unlike biases toward anxiety-related disabilities, attitudes toward individuals with ASD may be more resistant to change through social exposure alone. One possible explanation for this is that ASD-related biases are often shaped by cognitive stereotypes rather than emotional discomfort. While cooperative gameplay may temporarily reduce negative emotions, it does not necessarily challenge pre-existing assumptions about ASD traits, such as perceived social deficits or communication difficulties. Research suggests that interventions aimed at reducing ASD stigma

may need to incorporate structured education efforts, in addition to social exposure, to reshape cognitive perceptions of neurodiversity (Dickter et al., 2020).

These findings suggest that while cooperative video game play may facilitate short-term emotional changes, its impact on cognitive associations and avoidance behaviors is less consistent and may require longer-term engagement or structured reinforcement mechanisms. Given the variability in these effects, it is necessary to examine whether the intervention had a more pronounced impact on implicit biases, as explored in the next section.

Effect on Implicit Bias - DA-IAT. Unlike explicit biases, the cooperative video game intervention did not significantly alter implicit biases toward individuals with disabilities at either post-test or follow-up. Effect sizes were negligible, indicating that the intervention had no measurable impact on reducing unconscious biases.

These findings align with research suggesting that implicit attitudes are deeply ingrained and resistant to short-term interventions (VanPuymbrouck et al., 2020). While explicit biases can shift in response to cooperative play, studies indicate that implicit biases require extended and repeated engagement to change meaningfully (Gutierrez et al., 2014).

One possible reason for this resistance is that implicit attitudes operate automatically, without conscious control, making them less responsive to interventions that primarily target deliberate, self-reported attitudes. Unlike explicit biases, which can be shaped by personal reflection and social expectations, implicit biases are shaped by long-term socialization and cultural reinforcement (Nosek, 2005).

Another explanation is that cooperative video game play may not have directly challenged participants' unconscious associations with disability. While the game format may have encouraged behavioral engagement and reduced explicit avoidance, it did not necessarily

disrupt the deeper automatic biases that shape unconscious attitudes. Research suggests that implicit biases are more likely to shift when individuals repeatedly encounter counter-stereotypical information in diverse and meaningful contexts, rather than through singular or isolated experiences (Gutierrez et al., 2014).

These results indicate that while cooperative video game play may be effective in modifying some explicit biases, it does not significantly impact implicit biases toward disabilities. This suggests that implicit bias reduction requires a different approach, one that includes repeated exposure to counter-stereotypical experiences in varied contexts, rather than relying on structured but isolated cooperative interactions.

Interpretation of Research Question 3 (Baseline Loneliness & Belonging)

Participants' scores on the UCLA Loneliness Scale were elevated, suggesting that many students with disabilities experience significant levels of social isolation. Prior research highlights that individuals with disabilities often report higher rates of loneliness than their non-disabled peers, largely due to social stigma, accessibility barriers, and reduced opportunities for social interaction (Amado et al., 2013). A cross-sectional study by Emerson et al. (2021) reinforced this pattern, showing that individuals with disabilities experience loneliness at significantly higher rates, emphasizing the pervasive nature of social isolation in this population.

While some participants may have had access to disability support networks, these resources do not always translate into a broader sense of social inclusion. Additionally, past experiences with exclusion or stigma may contribute to ongoing difficulties in forming meaningful peer relationships. However, it is important to note that not all participants reported high loneliness levels, suggesting that some individuals have established social connections despite these broader challenges.

In contrast, Belonging and Engagement scores were relatively high, particularly in the Belonging subscale, where responses were clustered toward the upper end of the range. This suggests that many participants felt a sense of connection in specific spaces, though a subset of individuals reported lower belongingness levels. One possible explanation for this coexistence of loneliness and belonging is that while students with disabilities may feel accepted in certain environments (such as disability-related spaces), they may still experience social disconnection in broader peer interactions.

Self-confidence scores were moderate but slightly skewed toward lower levels, suggesting that some students with disabilities may struggle with self-assurance, potentially impacting their ability to initiate or maintain social interactions. Prior research indicates that higher self-esteem is associated with stronger social relationships and lower loneliness, particularly among students with disabilities (Brown & Leigh, 2021). For some participants, previous experiences with social rejection or misperceptions about disability may have led to hesitancy in forming new relationships, reinforcing patterns of social isolation even in supportive environments.

Given the elevated levels of loneliness observed, these findings suggest that while many students with disabilities report a sense of belonging and engagement, some individuals still face challenges with self-confidence and broader social integration. This highlights the complex nature of social connection, where support networks may exist, but full social participation remains an ongoing challenge.

Interpretation of Research Question 4 (Effects on Loneliness & Belonging)

Effect on Loneliness (UCLA Loneliness Scale). The results indicate that loneliness scores increased rather than decreased following the intervention, though these changes were not statistically significant at either post-test or follow-up. While the increase in loneliness was small immediately after the intervention, it became slightly more pronounced at follow-up, with a small to moderate effect size. However, these statistical results do not provide strong evidence that this pattern reflects a meaningful trend.

Unlike the Baseline Loneliness findings, which indicate pre-existing social barriers, the qualitative data suggest that the intervention temporarily alleviated these feelings but did not provide lasting relief. Participants generally described feeling included and engaged during the sessions but acknowledged that these effects did not always extend beyond gameplay. As one participant explained,

"The moments felt really positive, but an hour later due to depression or other things, I was feeling down." (H211)

This suggests that while the structured social environment of the game provided short-term relief from loneliness, broader personal and external challenges limited its long-term impact. One possible explanation for this is that the intervention introduced opportunities for social connection but did not provide strategies for maintaining those connections beyond the structured play environment. For participants who already struggled with loneliness, the contrast between feeling engaged during the game and returning to usual patterns of isolation may have heightened awareness of their loneliness rather than alleviated it. Additionally, the structured nature of gameplay may have created a temporary sense of connection without addressing deeper

systemic factors contributing to loneliness. One participant reflected on the rarity of social gaming experiences, stating,

"Being able to play with someone in person was great because I don't have many opportunities to play games with others in that way." (N161)

While this suggests that the intervention created valuable social moments, it also highlights that these interactions were limited to the study setting. This aligns with research indicating that while structured social activities can reduce immediate feelings of isolation, sustained engagement in broader social networks is necessary for long-term reductions in loneliness (Schuller et al., 2014).

These findings suggest that while cooperative gameplay fostered moments of inclusion, its effects on loneliness were temporary rather than transformative. This reinforces the need for longer-term interventions or supplementary engagement strategies to achieve lasting improvements in social connectedness.

Effect on Belonging (BES Subscales). The cooperative video game intervention did not significantly enhance Belonging, Engagement, or Self-Confidence immediately after the intervention, suggesting that it was not sufficient to drive immediate improvements in social integration and self-efficacy. However, qualitative data suggests that participants did experience a sense of inclusion during gameplay, particularly through the equalizing nature of cooperative tasks.

Perceived equality within gameplay interactions was a notable theme, aligning with Allport's Contact Theory, which emphasizes the importance of equal-status interactions in fostering positive intergroup relationships. One participant noted,

“It felt very equal to me. Within the game, it was easy to decide who wanted to do what, and even outside the game, there was equal status.” (H211)

Another participant expressed surprise at how well they collaborated with a much older partner, stating,

“I was positively surprised that I was able to play with someone twice my age.” (A121)

These responses indicate that while participants felt a sense of belonging within the structured environment of the study, this experience may not have translated into sustained improvements in belonging outside the study setting. One possible reason for this is that the structured nature of the sessions provided clear social roles and predictable interactions, making it easier for participants to feel comfortable in the moment. However, outside of this environment, social interactions may feel less structured and more uncertain, which could make it difficult to carry over the same sense of belonging into other contexts.

At follow-up, Belonging showed a small but non-significant positive trend, while Engagement and Self-Confidence both declined, with the reduction in Engagement reaching statistical significance. The qualitative findings offer possible explanations for this decline, particularly regarding the role of continued social contact and structured interactions. Participants described how repeated play built trust and reshaped perceptions across sessions, with one stating,

“Over time I saw that we would exchange pleasantries, and it felt that we were not just limited to talking about the game.” (J171)

Another noted,

“By the third session, we could suggest actions in shorthand rather than spelling everything out, which made everything smoother.” (Z191)

These responses suggest that as sessions progressed, players developed a sense of rapport and familiarity, yet the intervention's conclusion may have disrupted this emerging social connection, contributing to declines in Engagement at follow-up. One possible interpretation is that without an opportunity to maintain these social bonds, participants may have felt a sense of loss or disconnection when the structured interaction ended. This temporary improvement followed by decline may have heightened participants' awareness of their pre-existing social isolation, making the lack of continued engagement more noticeable.

The structured nature of the sessions played a critical role in fostering a sense of inclusion, as participants valued the predictability and consistency of the environment. One participant noted,

"The study environment, the same building, the same room, the same controllers, keeping that sense of continuity was big." (N161)

Another highlighted the importance of facilitator presence in shaping their experience, explaining,

"Your institutional support, your comments and cheers helped a lot, the slight pivoting prevented a lot of potential frustration." (H211)

These reflections suggest that while the intervention effectively created a socially supportive environment, its structured nature may have made it difficult for participants to generalize these experiences to broader social contexts. One possible reason for this is that while predictability and consistency helped participants feel comfortable, social situations outside of the study are often less structured, making social engagement feel more uncertain or difficult to navigate.

The results indicate that while some measures showed positive trends, statistically significant effects were limited, and retention effects varied. The qualitative findings reinforce this, showing that participants valued the structured inclusivity of the intervention, but its effects on social engagement and belonging were not sustained beyond the study setting. Research indicates that while cooperative gaming can enhance social skills and interaction among individuals with disabilities, its impact on deeper aspects of belonging and engagement may require additional reinforcement and longer-term strategies (Schuller et al., 2014).

These findings highlight the challenge of promoting long-term social integration and suggest that supplementary engagement strategies or extended interventions may be necessary to achieve more sustained improvements. For instance, providing opportunities for continued play beyond the study or integrating cooperative gameplay into existing social support structures could enhance its long-term impact. Participants themselves indicated that they would have preferred additional sessions, with one stating,

"A fourth session, and I would have preferred if the sessions were the same time of day and the same day of the week. That would have drastically improved my experience." (Z191)

This suggests that repeated and predictable interactions may be key to fostering sustained improvements in belonging, engagement, and self-confidence. One possible reason for this is that consistent scheduling may allow participants to build routines and expectations around social interactions, making it easier to maintain engagement over time.

Ultimately, while cooperative gameplay provided short-term benefits for inclusion and collaboration, its effects on belonging and engagement were temporary, reinforcing the need for longer-term interventions and sustained engagement opportunities to facilitate meaningful and lasting social integration.

5.2: Practical and Theoretical Implications

Implications for Educators and Disability Service Professionals

The findings suggest that cooperative video games may serve as a useful tool for fostering intergroup interactions in educational and disability service settings. The reduction in behavioral avoidance observed in participants after the cooperative gaming experience aligns with previous research demonstrating that structured intergroup activities can reduce social distance and improve comfort levels (Adachi et al., 2016). While explicit biases showed some degree of improvement, the lack of change in implicit biases indicates that single-session or short-term interventions may not be sufficient for deep-seated attitude shifts.

For educators and disability service professionals, this suggests that cooperative video games could be integrated into diversity training, disability awareness programs, or social inclusion initiatives. Structured play-based interventions may help students engage with disabled peers in a low-pressure, collaborative environment, where cooperation is incentivized through gameplay rather than forced social interaction. Additionally, incorporating multiple gameplay sessions over time may strengthen intergroup relationships and provide more sustained improvements in social engagement and bias reduction.

Implications for Bias Reduction Strategies

Traditional educational approaches to bias reduction, such as lectures and workshops, often focus on cognitive learning (e.g., increasing knowledge about disabilities) but may fail to reduce emotional discomfort or avoidance behaviors (Paluck & Green, 2009). In contrast, cooperative gameplay engages participants in active, immersive experiences, which encourage direct social interaction in a structured and goal-oriented manner. This study's findings suggest

that cooperative activities are particularly effective at modifying behavioral aspects of bias (e.g., reducing avoidance), even when explicit attitudes or implicit biases remain unchanged.

However, given that negative affect and implicit biases remained stable, cooperative gameplay may not be a standalone solution for bias reduction. Instead, multifaceted interventions that combine interactive experiences (e.g., cooperative games) with reflection-based activities (e.g., guided discussions, perspective-taking exercises) may yield greater and more lasting changes. Future programs could integrate structured debriefings following cooperative play, allowing participants to reflect on their experiences, address misconceptions, and reinforce positive social interactions (Dovidio et al., 2017).

Implications for Contact Theory Applications

This study contributes to Allport's Contact Theory by demonstrating that cooperative video games can create conditions conducive to positive intergroup contact. According to Allport (1954), effective intergroup contact requires equal status, common goals, cooperation, and institutional support. The qualitative results suggest that cooperative gameplay provided an equalizing environment, where participants felt on equal footing with their partners regardless of age or background. Additionally, shared goals within the game reinforced collaborative behaviors, reducing barriers to interaction.

However, the findings also highlight the importance of sustained contact. While participants developed greater comfort with their partners during the sessions, these effects were not sustained beyond the study, suggesting that short-term contact may not be sufficient for lasting bias reduction. This aligns with research indicating that longer-term, repeated intergroup interactions are more effective at reshaping implicit biases and fostering lasting social integration (Pettigrew & Tropp, 2006). Future applications of Contact Theory in gaming interventions

should emphasize ongoing exposure, perhaps through semester-long cooperative play programs or regularly scheduled inclusive gaming sessions within educational or community settings.

5.3: Limitations

Despite the valuable insights gained from this study, several limitations must be acknowledged, particularly concerning sample size, methodological constraints, and the generalizability of findings.

Sample Size and Statistical Power

One of the primary limitations of this study is the small sample size (N = 18), with only nine participants per condition. This limited number of participants reduces the statistical power of the analyses, making it more difficult to detect significant effects, particularly for smaller effect sizes. The presence of one identified outlier further exacerbates this issue, as even a single extreme case can influence group means and variability, particularly in small-sample studies. The underpowered nature of the study means that non-significant findings should be interpreted with caution, as true effects may exist but remain undetected due to sample size constraints (Button et al., 2013). Future research should seek to increase sample size to enhance statistical reliability and the generalizability of findings.

Potential Biases in Self-Reported Measures

The study relied on self-reported measures to assess explicit biases (MDMAS-Anxiety, MDMAS-ASD), belongingness (BES), and loneliness (UCLA Loneliness Scale). While self-report instruments are commonly used in psychological research, they are subject to several biases, including social desirability bias, response bias, and demand characteristics (Podsakoff et al., 2012). Participants may have underreported negative attitudes or avoidance behaviors due to societal expectations regarding inclusivity and acceptance, particularly given the focus of the

study on disability-related biases. Similarly, self-reported belongingness and loneliness may have been influenced by momentary affect or perceived expectations within the study context, rather than reflecting long-term, stable attitudes. Future studies should consider incorporating implicit measures (e.g., Implicit Association Tests) or behavioral indicators (e.g., observed social interactions) to provide a more comprehensive assessment of attitudes and social engagement.

Short Duration of Intervention

The intervention consisted of a limited number of cooperative gameplay sessions, which may not have been sufficient to induce long-term changes in attitudes or social behaviors. Research on intergroup contact and bias reduction suggests that sustained, repeated interactions over time are more likely to lead to lasting attitude change (Pettigrew & Tropp, 2006). While some short-term shifts in explicit biases were observed, the lack of significant reductions in implicit bias and the temporary nature of belongingness and engagement effects suggest that a longer intervention period may be necessary to achieve more durable outcomes. Future studies could explore longer-term interventions, incorporating multiple gaming sessions across several weeks or months, to examine whether extended cooperative play yields stronger and more lasting effects on bias reduction and social integration.

Ceiling and Practice Effects

Another limitation involves the possibility of a ceiling effect among disability services students, who may have already held relatively low levels of explicit bias at baseline due to their academic training in disability studies, counseling, and ethics. This pre-existing exposure to inclusive values and practices may have reduced the measurable impact of the intervention on explicit attitudes, limiting the potential for further bias reduction. Additionally, the repeated administration of the Disability Attitude Implicit Association Test (DA-IAT) raises the

possibility of a practice effect. Since participants completed the DA-IAT at three time points and were given twice the usual time to respond, some may have become more familiar with the structure and timing of the task, potentially influencing reaction times and reducing the sensitivity of the measure to detect genuine changes in implicit bias over time.

Lack of Triangulation and Saturation in Qualitative Data

The qualitative component of this study provided important contextual insights, but it was subject to several methodological limitations. With only five participants, the sample was too small to achieve thematic saturation, meaning that key themes may have remained underdeveloped or unexamined (Fusch & Ness, 2015). Additionally, no triangulation was performed, meaning that findings were not cross-validated through multiple data sources, independent coders, or alternative qualitative methods. The absence of triangulation raises concerns about the reliability and depth of the qualitative insights, as the reported themes were based on a single researcher's interpretation of participant narratives. Future research should expand the qualitative sample size, utilize multiple coders, and integrate alternative data sources (e.g., observational data, participant journals) to enhance the credibility and trustworthiness of qualitative findings.

Generalizability and External Validity

Given the small, self-selected sample, findings may not generalize to broader populations of students with and without disabilities. Participants in this study were volunteers, which may introduce selection bias, as individuals who chose to participate may have had preexisting interests in gaming, disability inclusion, or intergroup cooperation. Additionally, the study was conducted in a controlled environment, and it remains unclear whether similar effects would be observed in naturalistic social settings (e.g., classrooms, social gaming spaces). Future studies

should explore more diverse participant pools, including students from different educational settings, backgrounds, and levels of prior contact with disabled individuals, to assess the external validity of cooperative gaming interventions.

5.4: Recommendations for Future Research

Based on the findings and limitations of this study, several avenues for future research can be pursued to enhance the effectiveness and generalizability of cooperative gameplay interventions for bias reduction and social inclusion.

Testing the Intervention with Larger and More Diverse Student Populations

A key limitation of the current study was its small sample size and lack of demographic diversity, which limits generalizability. Future studies should increase sample size to enhance statistical power and better detect meaningful effects of cooperative gaming on explicit and implicit biases. Additionally, recruiting participants from different educational institutions, disciplines, and cultural backgrounds would allow researchers to explore how individual differences (e.g., prior contact with disabled individuals, gaming experience, personal attitudes) moderate the intervention's effects.

Expanding the study population to neurodivergent students, students with other marginalized identities, or non-student populations could also provide insight into how different groups experience and respond to cooperative gameplay interventions. Given that social integration challenges and bias-related experiences differ across contexts, understanding how cooperative gaming functions across diverse settings is critical for designing scalable and widely applicable interventions.

Addressing Implicit Bias Through Long-Term Interventions

The lack of change in implicit biases following the intervention highlights the resistance of automatic associations to short-term interventions. While explicit biases are more malleable and influenced by social desirability and cognitive learning, implicit biases are deeply ingrained through long-term cultural exposure and tend to shift more gradually (Charlesworth & Banaji, 2019). Future research should explore whether longer-term interventions or structured exposure to individuals with disabilities could reduce these implicit biases more effectively.

Future research could explore extended cooperative gameplay interventions, such as semester-long programs rather than single-session studies, to determine whether prolonged engagement leads to more substantial reductions in bias. Additionally, studies could examine the effects of repeated social contact with individuals with disabilities over time, assessing whether increased familiarity helps shift implicit associations. Another promising direction involves hybrid interventions that integrate cooperative gaming with educational workshops or real-world experiences, allowing participants to translate their in-game interactions into broader social contexts. These approaches could provide a more comprehensive and sustained strategy for fostering meaningful attitude change.

Structured Interventions to Reduce Negative Emotional Responses

While cooperative gameplay effectively reduced behavioral avoidance, negative emotional responses (Negative Affect) remained largely unchanged. This suggests that while structured cooperation can increase willingness to engage with disabled peers, it may not necessarily reduce discomfort, anxiety, or underlying emotional biases. Future research should examine whether structured interventions—such as guided reflection sessions, facilitated

discussions, or emotional regulation strategies—can help mitigate negative emotional responses while reinforcing positive associations.

For instance, interventions that explicitly address stereotypes and emotional reactions during or after cooperative gaming sessions could provide participants with opportunities to process their experiences and challenge their biases in real-time. Research on perspective-taking exercises and structured intergroup dialogue suggests that incorporating explicit reflection components into cooperative experiences may enhance their effectiveness in shaping emotional attitudes (Dovidio et al., 2017). Future studies could explore how combining cooperative play with structured debriefing or emotional processing activities influences both explicit and implicit attitudes toward individuals with disabilities.

Exploring Additional Cooperative Games and Virtual Reality Applications

The study focused on a single cooperative video game, but future research should explore a range of cooperative gaming formats to determine which mechanics, genres, or interaction styles are most effective for bias reduction. Different types of cooperative games—including strategy-based, narrative-driven, or real-time coordination games—may differentially impact social engagement, belonging, and implicit biases.

Beyond traditional video games, virtual reality (VR) applications offer an emerging avenue for immersive intergroup contact experiences. VR has been used successfully in perspective-taking interventions to reduce biases toward marginalized groups (Banakou et al., 2016), suggesting that VR-enhanced cooperative experiences could further amplify the benefits of intergroup cooperation. For example, VR could simulate real-world social scenarios, where participants must collaborate with virtual avatars representing disabled individuals, potentially deepening understanding and empathy.

Future studies should also explore how multiplayer VR environments—where participants engage in cooperative problem-solving in shared digital spaces—compare to traditional cooperative gaming in fostering positive intergroup experiences. If VR proves effective, it could serve as a scalable intervention tool for schools, universities, and disability advocacy programs.

5.5: Conclusion

This study explored the effectiveness of cooperative video gameplay as an intervention to reduce bias and promote social inclusion among students with and without disabilities. The findings provide valuable insights into the potential of interactive digital environments for fostering positive intergroup contact, aligning with Allport's Contact Theory and expanding the application of bias reduction strategies beyond traditional educational approaches.

The results indicate that cooperative gameplay was effective in reducing behavioral avoidance, suggesting that structured, goal-oriented collaboration can increase willingness to engage with disabled peers. However, explicit and implicit biases functioned independently, with implicit biases remaining largely unchanged, reinforcing the idea that deep-seated attitudes may require longer-term or multi-faceted interventions. Additionally, while some short-term improvements in belonging and engagement were observed, these effects were not sustained over time, underscoring the importance of continued intergroup interaction for long-term social integration.

From a practical standpoint, these findings highlight the potential role of cooperative gaming as a tool for educators and disability service professionals in fostering inclusive environments. The study suggests that while gaming interventions can create temporary social

connections, they should be supplemented with ongoing engagement opportunities to promote lasting attitudinal and behavioral change.

Theoretically, this study contributes to Contact Theory applications in digital spaces, demonstrating that cooperative video gaming can provide equal-status interactions and shared goals, which are key conditions for effective intergroup contact. However, the findings also emphasize the need for sustained exposure, aligning with broader research suggesting that intergroup bias reduction is most effective when interactions are repeated and reinforced over time.

Despite its limitations, this study advances our understanding of how cooperative gameplay can influence bias and social belonging. By integrating insights from quantitative and qualitative data, it provides a nuanced perspective on the potential and limitations of digital interventions for improving intergroup relations. Future research should build upon these findings by expanding participant diversity, exploring long-term effects, and incorporating alternative interactive formats such as virtual reality.

Ultimately, this study emphasizes the importance of interactive, cooperative experiences in shaping social attitudes. While video games alone may not be sufficient to eliminate bias, they offer a promising platform for fostering initial contact and engagement, laying the foundation for broader inclusion efforts in educational and social settings.

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APPENDIX A: SEMI-STRUCTURED INTERVIEW TOPICS AND QUESTIONS

Introduction (5 minutes)

1 Before this study, what was your experience with video games, particularly cooperative games?
2 What were your initial expectations about participating in the gaming sessions?

Exploring Contact Theory (25 minutes)

Equal Status (5 minutes)

3 Did you feel like you and your partner had equal roles during the gaming sessions? Can you share an example?
4 Were there moments when you felt your abilities or background influenced the dynamics with your partner?

Common Goals and Cooperation (10 minutes)

5 How did working toward shared goals affect your interactions?
6 Can you describe a moment when teamwork with your partner felt particularly rewarding or challenging?
7 Did any game mechanics encourage or hinder cooperation? How did that impact your experience?

Sustained Contact (10 minutes)

8 Over time, did your perception of your partner change? How so?
9 Did repeated interactions make it easier to trust or connect with your partner? Could you share an example?

Impact on Social Inclusion (25 minutes)

Social Inclusion (10 minutes)

12 Did these sessions affect your sense of connection or belonging? How?
13 Was there a specific moment where you felt especially included or excluded?

Feedback (5 minutes)

14 What aspects of the sessions worked well for fostering positive interactions?
15 If you could change one thing about the sessions, what would it be?

APPENDIX B: INFORMED CONSENT AND DISCLOSURE FORM

Title of Study: The Impact of Cooperative Contact via Video Games on Biases and Social Exclusion Among Students with Disabilities

Principal Investigator: Michael Yeomans, Doctoral Candidate, Michigan State University

Contact Information: yeoman12@msu.edu, (517)-290-8281

Purpose of the Study:
The purpose of this study is to investigate the impact of cooperative contact via video games between disability services students and students with ADHD, Autism Spectrum Disorder, and/or Mental Health Disorder on explicit and implicit biases, as well as feelings of loneliness, social isolation, and belonging.

Study Procedures:
Participants will be involved in the study over the course of one semester. The study will involve the following activities:

1. Baseline: Participants will complete a series of questionnaires and assessments at the beginning of the semester.
2. Intervention: Participants will engage in a cooperative activity involving playing a video game in pairs over multiple sessions during the semester. Sessions will last 45 minutes and four sessions totaling two hours will occur over four weeks.
3. Mid-Intervention Assessment: Participants will complete another set of questionnaires and assessments following the final treatment lab.
4. Posttest: At the end of the semester, participants will complete the final set of questionnaires and assessments.
5. Semi-structured Interviews: A subset of participants will be invited to undergo semi-structured interviews to gauge their experiences with the lab.

Participation Criteria:
- Participants must be students at Michigan State University.
- Non-disabled group: Must be enrolled in a disability services program.
- Disabled group: Must be registered with the university's Resource Center for Persons with Disabilities (RCPD) with a documented diagnosis of ADHD, Autism Spectrum Disorder, and/or Mental Health Disorder.
- Participants must be between 18 and 35 years old.
- Must provide informed consent.

Voluntary Participation:
Participation in this study is voluntary. You may choose not to participate or to withdraw from the study at any time without penalty or loss of benefits to which you are otherwise entitled.

Confidentiality:
All information collected in this study will be kept confidential. Your responses will be anonymized, and data will be stored securely. Only the research team will have access to the data. No personal identifying information will be used in any reports or publications resulting from this study.

Potential Risks and Discomforts:
There are minimal risks associated with this study. Participants may experience mild discomfort or fatigue from completing the questionnaires and assessments. If you feel uncomfortable at any time, you may skip questions or discontinue your participation.

Potential Benefits:
While there are no direct benefits to you for participating, your involvement will contribute to a better understanding of how cooperative contact can reduce biases and improve social integration among students with and without disabilities.

Incentive Information:
As an incentive for participation, students will receive a $10 gift card following each cooperative gameplay session, and an additional $20 gift card following the final data collection, totaling $60 if all sessions and follow-up are attended. These incentives are designed to encourage consistent participation and completion of all data collection points.

Contact Information:
If you have questions, concerns, or complaints, or think the research has hurt you, you can talk to the research team at (517) 290-8281 or yeoman12@msu.edu.
This research has been reviewed and approved by an Institutional Review Board. You may talk to them at (517) 355-2180 or irb@msu.edu if:

- Your questions, concerns, or complaints are not being answered by the research team
- You cannot reach the research team
- You want to talk to someone besides the research team
- You have questions about your rights as a research subject
- You want to get information or provide input about this research

Consent:
By signing below, you acknowledge that you have read and understood the information provided above, and you agree to participate in this study. You will receive a copy of this consent form for your records.

Participant's Name (Printed): _____

Participant's Signature: _____

Date: _____

Researcher's Name (Printed): _____

Researcher's Signature: _____

Date: _____