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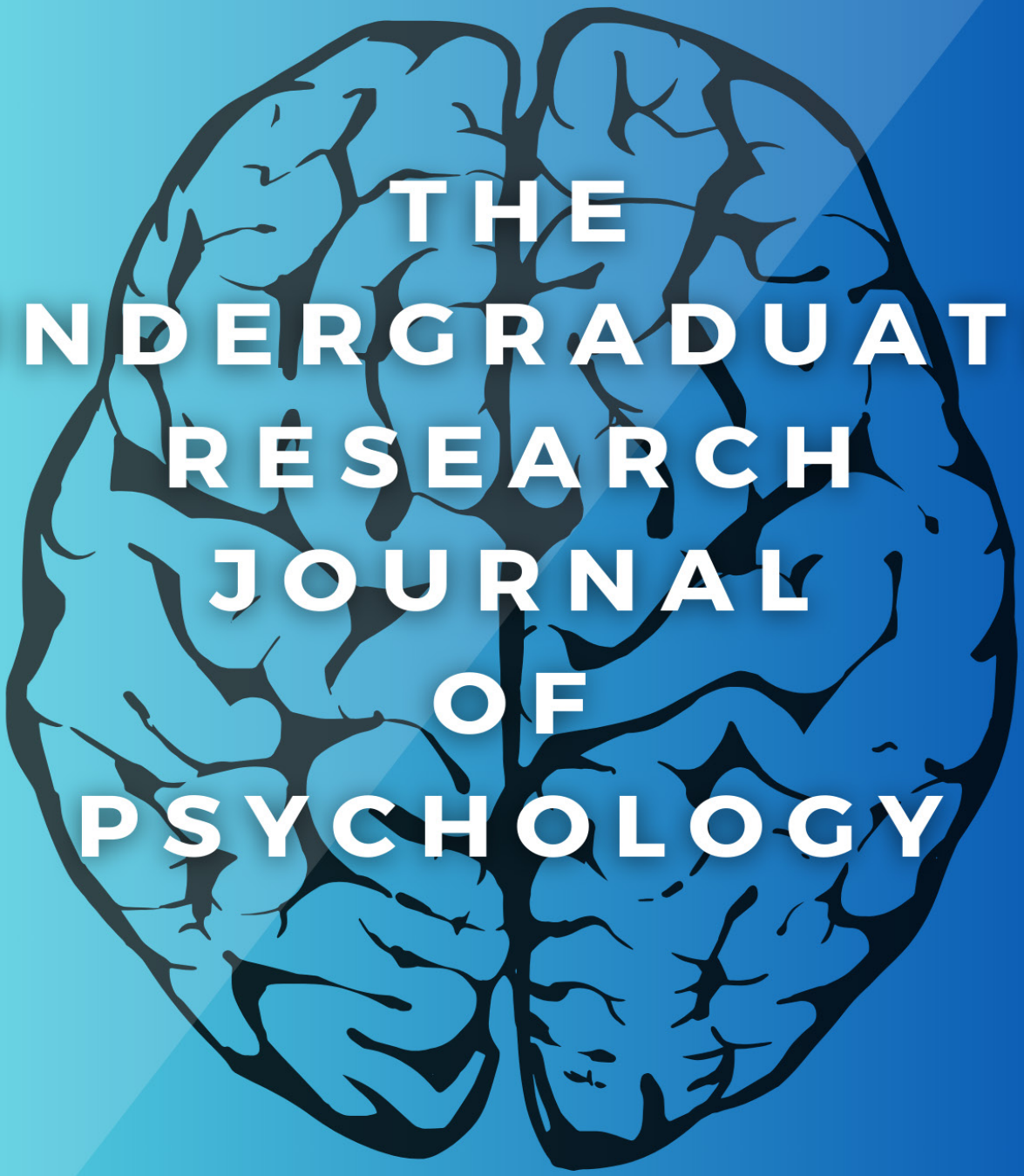

THE UNDERGRADUATE RESEARCH JOURNAL OF PSYCHOLOGY

11th Edition, 2024

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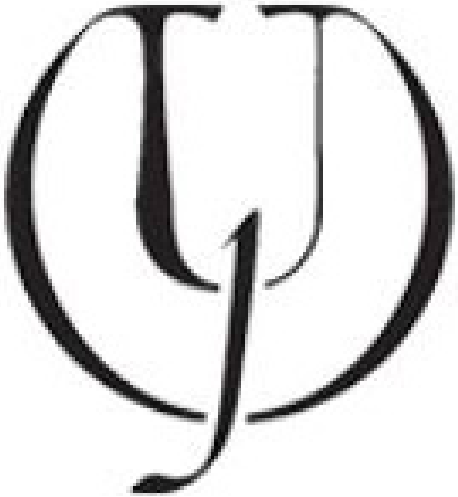
ACKNOWLEDGMENTS

Graduate Student Mentors

Charlotte Kelly
Wave Baskerville
David G. Kamper
Gabrielle Rinne
Riley Marshall
Yuhan Cheng
Gabrielle MacNaughton



Special thanks to our founders and past members, Dr. Aaron P. Blaisdell, Dylan Sarnowski and the rest of the University of California, Los Angeles, Department of Psychology, and all of the faculty, staff, and graduate students who have supported us throughout the years.

NOTE FROM THE EDITORS-IN-CHIEF

Dear Readers,

We are thrilled and proud to announce the release of the 11th annual edition of the Undergraduate Research Journal of Psychology at the University of California, Los Angeles. Since August of 2023, our team has worked diligently to collect and anonymize submissions, create and share psychology-related content with our community, and select the highest quality articles for this edition. We are especially excited for you to read the work of our seven distinguished authors from LA to New York. These authors have achieved an incredible feat of producing or advancing original research during their undergraduate careers. Our editors take great joy in seeing their excellent work published.

We also want to acknowledge the various challenges faced by our team and authors this year. Globally, ongoing conflicts—such as those related to the genocides in Palestine, South Sudan, and Myanmar—continue to be fueled by universities including our very own. We wish to acknowledge these atrocities and demand for universities to divest from war-propogating entities.

From our first edition, we have been a student-run organization for students to have their academic work published. Now more than ever, we believe in the importance of platforms that uplift the efforts of students. We hope this journal can emphasize the fact that undergraduate researchers are already capable of high quality work deserving of scholarly publication. We celebrate the acheivements of these authors and look foward to following their future careers with great enthusiasm.

Without further ado, we present our 11th edition. We hope you enjoy reading it as much as we have enjoyed creating it.

Sincerely,

Irene Chang and Jeffrey Yang

Editors-in-Chief

PREFACE

Riley Marshall, M.A.
Doctoral Candidate
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It is my privilege to write the preface for the eleventh volume of the Undergraduate Research Journal of Psychology (URJP) at the University of California, Los Angeles. The URJP provides an avenue for undergraduate researchers to publish in a peer- reviewed journal in order to promote the thoughtful and impactful work being done in Psychology.

The URJP sets undergraduate researchers up for success by providing experience with both sides of the peer review process. To be published in the URJP, submissions are evaluated by members of the organization and graduate student mentors in order to provide critical feedback. For both parties, this serves as a chance to refine one's ability for scientific writing, understand how to respond to reviewers, and contribute to the psychological literature. The URJP team has done this excellently for years, and this volume is no different.

I would like to extend my heartfelt congratulations to this year's authors. Their dedication is evident in the extensive research projects they have undertaken, the multiple rounds of writing and peer reviews they have navigated, and the meticulous edits they have made. Their work exemplifies the core goals of scientific inquiry—advancing their field and contributing to the literature in ways that inspire future research.

This volume begins with a focus on linguistics, with papers exploring the use of reflexive pronouns, emotion-related words, and emotional sounds, and their implications for educators and caretakers. It also addresses the ongoing need for mental health research, from theorizing interventions to reduce death anxiety to identifying moderators of intergenerational conflict. Finally, the journal includes studies on relationship dynamics, both parasocial and romantic, highlighting their impact on well-being and future behaviors.

These papers demonstrate the remarkable capabilities of undergraduate researchers and the innovative ideas they bring to the field. I invite you to delve into the eleventh volume of the URJP and discover the exciting contributions of these emerging scholars.

Sincerely,

Riley Marshall

Yue Chen, BA, University of California, Los Angeles

Yue is an incoming PhD student in Linguistics at the University of Southern California (USC). She graduated with both college and departmental honors from the University of California, Los Angeles (UCLA) in 2023, earning a Bachelor of Arts degree in Linguistics and Psychology. During her time at UCLA, she contributed as a research assistant in Dr. Catherine Sandhofer's Language and Cognitive Development Lab and in Dr. Jesse Harris's Language Processing Lab. Currently, Yue is a research assistant at The Chinese University of Hong Kong (CUHK), where she works under the supervision of Dr. Maggie Ziyin Mai on projects focused on multilingualism and language acquisition.

Was there a particular experience that sparked your research interests?

A defining moment that sparked my research interests occured during my freshman year when I discovered an academic paper written sixty years ago. As I read through the author's insights and theories, I was struck by the realization that their thoughts mirrored my own. The connection across decades profoundly moved me and underscored the timeless impact of sharing inteleectual work. It was then that I decided I also wanted to contribute my voice to the academic community, hoping that my research might similarly inspire and resonate with future scholars.

Who has been the most influential person in your life?

The most influential people in my life are those who offered me support and kindness during my academic journey. Their collective encouragement and guidance shaped who I am today, reinforcing my belief in the power of community and the inportance of helping others.

What is your greatest accomplishment?

One of my greatest accomplishments is graduating with both college and departmental honors from UCLA as a first-generation college student and receiving an offer to pursue a PhD degree in Linguistics at USC. Without a family history in academia, navigating the complexities of higher education was a formidable challenge. Each step, from deciphering financial aid options to seeking academic advising and mentorship, was a significant learning curve.

Where do you see yourself in 10 years?

In ten years, I envision myself as a scholar specializing in language acquisition and language processing. Additionally, I am committed to expanding opportunities and enhancing support for first-generation and underrepresented students.

Acquisition of English Reflexive Pronouns: Evidence from Naturalistic Observation

Yue Chen, Emily Neer*, Erjing Zhang*, Dr. Catherine M. Sandhofer*
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Department of Psychology, University of California, Los Angeles, US

Recent research suggests that children face challenges in acquiring pronouns, particularly reflexive pronouns where the subject and object share the same referent (e.g., "herself") (Chien & Wexler, 1990). There is an ongoing debate regarding the age at which children develop an adult-like understanding of reflexive pronouns. Scholars from a syntactical perspective argue that children grasp this understanding around the age of two, or even earlier, within naturalistic settings due to the straightforward grammatical function of reflexive pronouns compared to personal pronouns. They suggest that reflexive pronoun acquisition primarily relies on syntactic cues, as they should solely refer to a referent within a sentence. In contrast, scholars from a pragmatic standpoint propose that adult-like understanding typically emerges between the ages of 5 to 7, necessitating additional pragmatic knowledge acquired through language input in children's environments. To test these theories, our study examines parental language input regarding personal and reflexive pronouns in the everyday interactions of 2-year-olds. Utilizing data from the Science of Everyday Play corpus (Tamis-LeMonda & Adolph, 2017), including fourteen 2-hour naturalistic play video recordings and transcripts, we uncover a contextual dependency in pronoun usage. This sheds light on the interaction between children's pragmatic knowledge and the theories of pronoun acquisition. For instance, parents tend to use "he/himself" more frequently during book reading (constituting 64.7% of overall reflexive pronoun use during book-reading) and "you/yourself" more during play contexts (accounting for 92.3% of overall reflexive pronoun use during play). Our findings suggest that young children demonstrate an understanding of certain reflexive pronouns at an early age, supporting the pragmatic account from previous literature. This indicates that children may require additional pragmatic knowledge alongside syntactical understanding to fully acquire reflexive pronouns. These findings have significant implications; educators may find value in integrating activities that promote active engagement into their teaching methodologies, as this approach not only supports language development but also emphasizes the crucial role of real-life, interactive experiences in language acquisition.

Keywords: Caretaker Input, Acquisition, Reflexive Pronouns, Lexicon, Pronouns, Differentiation, Naturalistic

Introduction

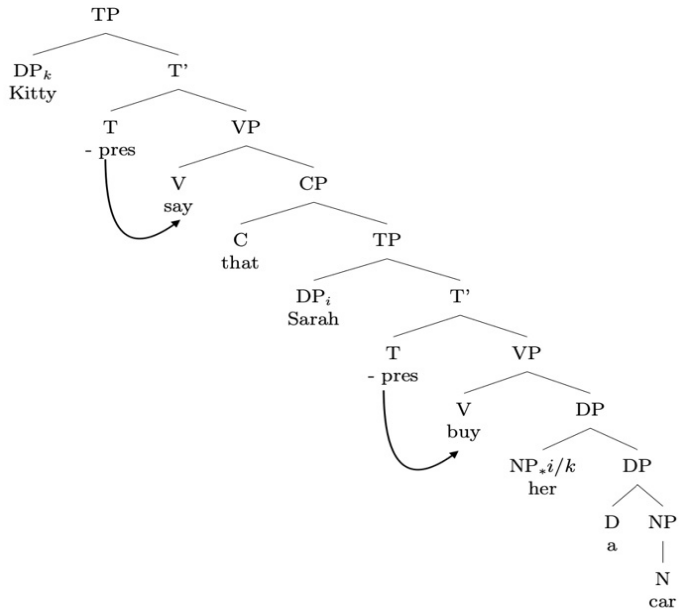
Language development is a complex and fascinating process, particularly when it comes to acquiring personal pronouns (e.g., "you") and reflexive pronouns (e.g., "yourself"). Pronouns serve as fundamental building blocks of language, acting as abstract representations that refer to real-world entities based on contextual cues in conversation. They possess remarkable grammatical versatility, effortlessly transitioning between roles as subjects and objects within sentences (Trask, 1993; Lewis, 2022). Essentially, pronouns play a pivotal role in communication, simplifying discourse and facilitating both production and comprehension processes (Deen & Becker, 2020; Meltzer-Asscher, 2021). The usage of pronouns varies across different social contexts (Dawson et al., 2021), and children demonstrate different learning patterns in different environments (Wohlwend, 2008; Wohlwend, 2022; Prins et al., 2023).

Understanding pronoun acquisition within the broader context of language development offers insights into both theoretical and practical aspects of the cognitive mechanisms underlying language acquisition. It reveals how children comprehend abstract linguistic concepts and employ them in everyday communication, influenced by the linguistic input available in their environment. Moreover, educators can also harness this understanding to enrich children's cognitive development and enhance their proficiency in pronoun usage, thereby promoting optimal language development. In essence, a thorough comprehension of pronoun acquisition enriches our understanding of language acquisition processes and informs educational interventions designed to support children's language development journey.

Definitions of Personal Pronouns and Reflexive Pronouns and Their Contexts

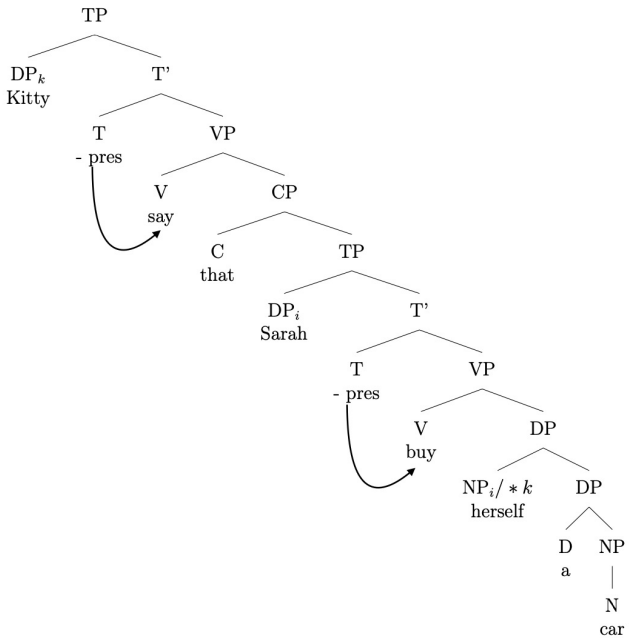
Personal pronouns serve as convenient and efficient means of referring to oneself or others, simplifying communication by representing real-world references in a single word. They possess grammatical flexibility, functioning as both subjects and objects within a sentence. Personal pronouns acquire their reference either through linguistically unbound references (e.g., references that do not occur within a sentence but are presented in the real world or in utterances from previous discourse) or through linguistically bound references (e.g., references are grammatically related to the pronouns) within the sentence itself (e.g., "Kittyk said that Sarahi bought her*i/k a car"[1], the personal pronoun her is grammatical when it is coindexed with the matrix subject "Kitty", but it will be ungrammatical when it is coindexed with "Sarah") (Wales, 1996; Truswell, 2014), where her could be refer to Kitty but not Sarah. There are twelve personal pronouns in the English language, including I, me, you, he, she, it, we, they, them, us, him, and her (Trask, 1993).

Figure 1: Personal Pronoun Syntax Binding Tree



On the other hand, reflexive pronouns are specifically used in the object position of a sentence and function as locally bound referents of the subject within the sentence (e.g., "Sarahi bought herselfi a car", see a more detailed syntax tree in Figure 2) (Stern, 2022), where the subject of the sentence, "Sarah," serves as the antecedent and the higher NP of the reflexive pronoun "herself." In other words, reflexive pronouns that end in "-self" or "-selves" are restricted to referring only to the subject within a sentence when the subject and object are the same entity. For example, in the sentence "I believe in myself," the subject "I" is syntactically bound and refers to the same entity as the object "myself." English has nine reflexive pronouns: myself, yourself, himself, herself, oneself, itself, ourselves, yourselves, and themselves (Trask, 1993).

Figure 2: Reflexive Pronoun Syntax Binding Tree



Apart from differences in syntactic positions, personal pronouns and reflexive pronouns also differ in their syntactical and pragmatic functions. Personal pronouns serve to convey distinctions among individuals, numbers, animacy, sex, gender, and various other categories, offering a wider array of linguistic cues and functions compared to reflexive pronouns. For instance, personal pronouns can occupy the matrix subject position of a sentence or function as a referential object within it, while reflexive pronouns can only take the object position of a sentence (Deen & Becker, 2020). The limitation in the syntactical placement underscores a key aspect of their pragmatic function, which is emphasizing the action or attribute of the subject as being directed back upon itself. Notably, personal pronouns, particularly "you," are prevalent in everyday conversations, reflecting their frequent usage in caregivers' daily spoken language. In contrast, reflexive pronouns like "yourself" are typically encountered during book-reading sessions. It is observed that pronouns occurring across multiple environmental contexts (e.g., book-reading, play, mealtime) are acquired earlier by children (Hills et al., 2009; Hills, 2013; Hills et al., 2010; Dawson et al., 2021).

1 i, k and * are the standard denotations in linguistics that means the noun phrase (NP) may or may not coindex with the personal pronoun. i and k are often used as grammatical coindex relations and * are used to refer to ungrammatical, see a more detailed syntax tree in Figure 1)

Acquisition of Personal Pronouns and Reflexive Pronouns

The acquisition of personal pronouns has been extensively explored, indicating that children typically grasp these pronouns around the age of 5 to 7 through various discourse contexts, as evidenced by both experimental studies and naturalistic observations (Wexler & Chien, 1985; Oshima-Takane, 1988; Chien & Wexler, 1990; Bohn et al., 2020). Leading scholars such as Chien & Wexler (1990) have conducted experiments to delve into how children comprehend personal pronouns within controlled experimental settings. Their findings suggest that children utilize both syntax and pragmatic cues in understanding personal pronouns, leading to complete acquisition around the age of 5 to 7. Oshima-Takane (1988), focusing specifically on the acquisition of personal pronouns in various contexts, investigated how children acquire pronoun knowledge through overheard conversations. Her research revealed that children can learn about personal pronouns even when not directly addressed, demonstrating their sensitivity to discourse context. These findings underscore the significance of discourse context in shaping children's interpretation of ambiguous personal pronouns, indicating their capacity to retrieve information from diverse contexts and prior discourse.

In fact, the acquisition of reflexive pronouns from different discourse contexts remains contentious in both naturalistic and experimental settings. Chien & Wexler (1990) and Wexler & Chien (1985) suggested that children acquire reflexive pronouns earlier than personal pronouns and achieve an adult-like understanding of reflexive pronouns around the age of 5 years and 6 months, employing both syntactical and pragmatic knowledge. Conversely, others suggest that children can fully comprehend reflexive pronouns in naturalistic settings as early as two years old, solely relying on syntactical knowledge without needing additional pragmatic cues (McKee, 1992; Grodzinsky & Reinhart, 1993; Deen & Becker, 2020). For example, McKee (1992) utilized true value judgment tasks to assess children's understanding of reflexive pronouns in a play setting. However, this method may introduce biases based on children's responses, influenced by factors like emotional tones or facial expressions of experimenters. Overall, the acquisition of reflexive pronouns in various learning contexts and everyday naturalistic settings remains debated, emphasizing the importance of considering broader contextual factors such as parental input and environmental influences in understanding children's language development (Wexler & Chien, 1985; Chien & Wexler, 1990; McKee, 1992; Grodzinsky & Reinhart, 1993; Deen & Becker, 2020). Examining children's language acquisition though naturalistic observation allows for a more comprehensive understanding, considering the diverse and salient learning contexts present in everyday environments (Wohlwend, 2008; Klein & Becker, 2017; Chang & Deák, 2020; Hill & Wagovish, 2020; Wohlwend, 2022).

Context Effects of Children's Language Acquisition

Previous research underscores the crucial role of context in children's language acquisition. Language development often unfolds within specific learning environments, such as mealtime discussions, face-to-face play, and educational interactions (Klein & Becker, 2017; Chang & Deák, 2020; Hill & Wagovish, 2020; Hu et al., 2021). These settings typically focus on nouns, verbs, and discourse topics, with particular attention to pronoun usage in contexts involving multiple individuals, such as interactions between children and caregivers or peers (Bojczyk et al., 2016; Chang & Deák, 2020; Contemori & Tortajada, 2020; Adi-Bensaid et al., 2022). For example, research on book-reading highlights the richness of vocabulary found in picture books compared to everyday conversations, significantly enhancing children's language skills and word acquisition (Farrant & Zubrick, 2013; Bojczyk et al., 2016; Dowdall et al., 2020; Dawson et al., 2021). Certain contexts, such as mealtime and playtime, play vital roles in fostering language development by providing ample speech input. Among these contexts, playtime emerges as particularly significant, as it encourages frequent interactions between caregivers and children, necessitating heightened engagement from children compared to mealtimes. Playtime offers more dynamic interactions and positive reinforcement for learning, facilitating children's understanding of relationships between characters or objects during pretend play, thereby enhancing their comprehension of pronouns (Adi-Bensaid et al., 2022; Wohlwend, 2022; Prins et al., 2023). In conclusion, previous research underscores the critical influence of context on children's language acquisition. Contexts like playtime and mealtime offer unique opportunities for language development, with playtime fostering interactive engagement and a deeper understanding of pronouns. As we delve into our study, we will explore how different environmental contexts impact children's acquisition of reflexive pronouns.

Current Study

This study examined caregivers' use of reflexive and personal pronouns within a naturalistic play setting. Three main research questions were explored:

1. How do parents use reflexive and personal pronouns differently in naturalistic environments, and what variations exist in pronoun usage among families?
2. How does parents' use of reflexive pronouns vary across different contexts, such as free discourse, play, and book reading?
3. Do two-year-old children demonstrate an understanding of reflexive pronouns in their everyday environments?

The first objective was to examine the differences between parents' usage of reflexive and personal pronouns in naturalistic settings. It was hypothesized that personal pronouns would be more prevalent in daily discourse, especially within parent-child interactions, compared to reflexive pronouns. Existing research has found that personal pronouns are more common in daily discourse and reflexive pronouns are more common during book-readings (Bojczyk et al., 2016; Dowdall et al., 2020). By analyzing the occurrence and frequency of reflexive and personal pronouns, this study aimed

to gain a better understanding of the linguistic input provided by caregivers and its potential impact on children's language development.

Three exploratory analyses were conducted to further explore families' pronoun usage in a naturalistic setting. The first analysis focused on the variability in pronoun usage across different families, aiming to identify distinct patterns of pronoun usage within families. The second analysis examined contextual differences in the usage of reflexive pronouns, specifically in discourse contexts such as play, book reading, and other daily interactions (e.g., phone-calling). Investigating families' pronoun usage and the use of reflexive pronouns within different discourse contexts provides valuable insights into the role of caregiver-child interactions and child-directed speech in the acquisition and usage of these pronouns. The third analysis of the study explored children's verbal or behavioral responses to parents' pronoun usage as an indicator of their understanding of reflexive pronouns.

Therefore, the study aimed to determine if the 2-year-old participants showed more verbal or behavioral responses associated with reflexive pronouns than personal pronouns which will provide positive evidence for the learning trajectory of earlier acquisition of reflexive pronoun than personal pronoun, potentially as early as two years old. This study offers valuable insights into early language development theory and the dynamics of caregiver-child interactions by examining pronoun usage across various discourse contexts based on parental input, which will hold a promise for future educators, offering potential applications in language teaching methodologies.

Method

Participants

All participants (N = 16; Nfemale = 8) were typically developing native English speakers who is born and raised in the United States. There are two participants who did not produce any reflexive pronouns, so they were excluded from further data annotation, in which gives 14 participants in total (Nfemale = 7, Mage = 22.94 months; SD = 0.15 months; Rangeage = 22.8 - 23.3 months). The racial and ethnic breakdown of the participants were White (N = 10), Multi-Racial (N = 3), and Other (N = 1).

Dataset

Fourteen two-hour video recordings of mother-child naturalistic interactions from The Science of Everyday Play dataset (Tamis-LeMonda & Adolph, 2017) from Databrary (Gilmore et al., 2016) were used in the current study. Data collection of the corpus took place from October 2017 to February 2020. The corpus included 234 hours of video recording (across 2 visits, 2 hours per visit) of children and their mothers going about their daily routines from the age of 12 to 23.8 months. A research assistant followed the child and recorded the family's daily routines during two visits. Routines included toy play, book reading, and other activities, such as phone calls and mealtimes. The current study used video recordings and vocabulary data from the first visit of children between 22- to 23-months-old.

Procedure

The Tamis-LeMonda and Adolph research team transcribed participants' video recordings. We used the provided transcriptions and participants' video recordings to code for both personal and reflexive pronouns used by parents. We also identified different activity contexts (e.g., book reading, toy play, etc.) and analyzed children's verbal and behavioral responses to parent pronoun speech.

Data Annotation

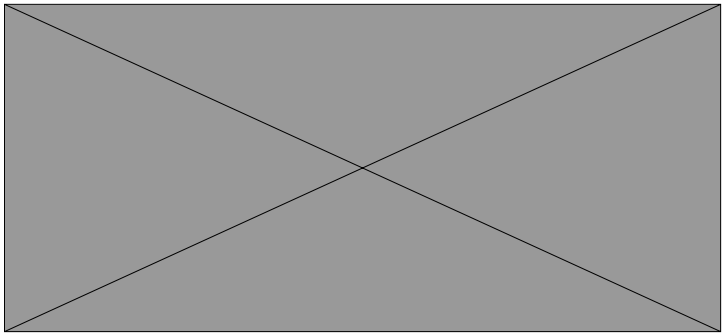
Frequency Coding. To answer the first research question about how often parents use pronouns in naturalistic speech, we identified the number of personal and reflexive pronouns present in parent speech from each transcript. The frequency proportion is calculated by the total occurrences of personal pronoun and reflexive pronoun divided by the total utterances of the caregiver.

Activity Context Coding. To understand how parents' reflexive pronoun use differed between activity contexts in naturalistic environments, we coded the context in which parents used reflexive pronouns. We coded three main activity context categories: play, book-reading, and other. The play activity context involved different types of play, such as drawing, toy play, and more. For example, "No you wanna do it by yourself?" In this sentence, the reflexive pronoun "yourself" refers to the child who's playing with the toy. The book reading activity context involved children and parents reading a storybook together. For example, "he'll crawl in and make himself comfortable." In this sentence, the reflexive pronoun "himself" refers to the book character in the storybook that the caregiver and the child were reading. The other activity context involved all the non-play and non-book-reading activities, such as parents making phone calls. In this context, parents would use pronouns to refer to another person, object, or abstract concepts outside of the parent and child's immediate environment. For example, "I used to like to do that, like bring it on internet and I didn't give myself a title" In this sentence, the reflexive pronoun "myself" refers to the caregiver, and the whole sentence is presented in a phone calling session.

Children's Response Coding. To understand how children responded to different pronoun types used by parents, we coded whether children offered a behavioral and verbal response after a parent said a reflexive or personal pronoun. Because there is a large difference between the personal pronoun and reflexive input within children's daily environment, such as the occurrences of personal pronouns will be significantly more than the occurrences of reflexive pronouns (Dawson et al., 2021) in order to minimize the statistical bias for our future children's response coding analysis, we paired utterances with a reflexive pronoun and utterances with a personal pronoun of the

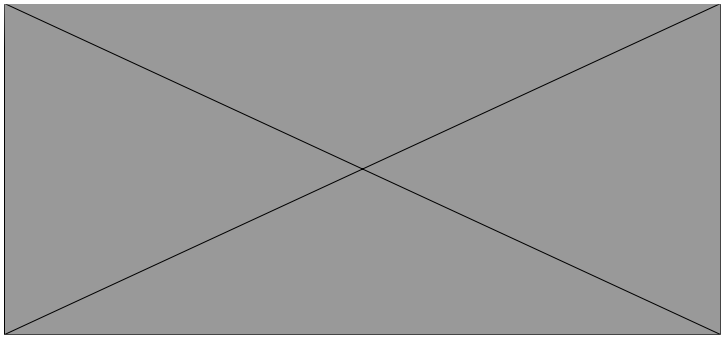
same content, same referent, from the same activity context and within the same participant. An example of paired utterances can be found in Table 1.

Table 1: *Paired-up Sentences Examples*



Children's verbal or behavioral responses were coded if they responded to the parent within a 10-second interval. Children's verbal responses included their vocal response to the caregiver within the interval after their parent used a pronoun. The behavioral response included children successfully retrieving a referent object of the pronoun parents used. Children who were satisfied with one of the verbal or behavioral responses after the occurrence of the pronoun were coded as a child who understood the pronoun (Table 2).

Table 2: *Children's Behavioral Response and Verbal Response Example*[2]



Reliability

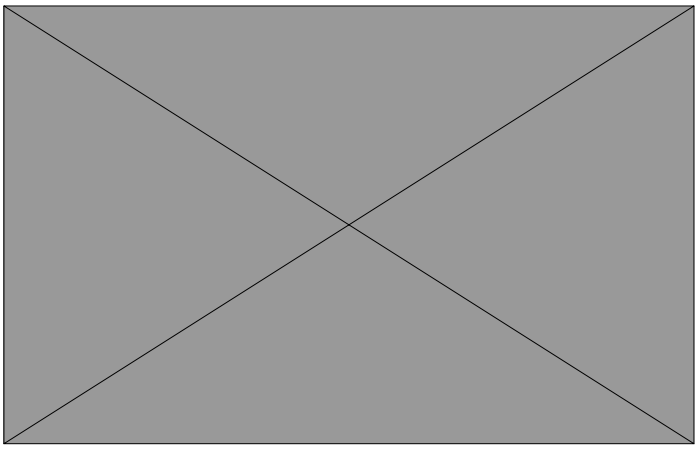
The initial coding of reflexive pronouns was carried out by the first author, Y.C. To ensure the reliability of the reflexive pronoun coding, a second trained coder independently coded 30% of each transcript[3]. High inter-rater reliability was achieved (κ = 0.98; range = 0.95 - 1.0). Similarly, the contextual coding of reflexive pronouns was conducted by the first author, Y.C. An additional trained coder coded 30% of each transcript to evaluate the reliability of context coding. The inter-rater reliability was found to be high (κ = 0.93; range = 0.85 - 1.0). For the coding of parents' use of personal pronouns in the transcripts, two trained coders were involved. One coder was designated as the primary coder for each transcript, while a second coder independently coded 20% of the transcripts to assess reliability. The inter-rater reliability was substantial (κ = 0.96; range = 0.86 – 1.0). Any discrepancies between coders were resolved through discussion between the primary and secondary coders and were included in the final dataset.

Results

Frequency

First, we assessed if there were input differences between personal pronouns and reflexive pronouns in the daily discourse. Personal pronouns were much more common than reflexive pronouns, comprising 34.665% of overall utterances produced (10,992 occurrences out of total 31,709 utterances). Reflexive pronouns only comprised 0.155% of the overall utterances produced (49 out of total 31,709 utterances). Specifically, "you" was the most frequent personal pronoun, taking 11.252% of total parental production (3568 occurrences), while "us" was the least frequent taking 0.202% of overall parental input (64 occurrences). Among reflexive pronouns, "yourself" was the most common taking 0.101% of parental input (32 occurrences), while "herself/itself/themselves" each occurred only once, taking 0.003% of overall parental input. There were no occurrences of "oneself" or "ourselves" across all 16 participants (see Table 3 for more details).

Table 3: *Personal Pronoun and Reflexive Pronoun Parental Input Frequency Breakdown*



2 Note: Table 2: MOT means the caregiver (e.g., the mother of the child), CHI means the participated child in the dataset. All utterances are in the CHAT transcription format (MacWhinney, 2000).

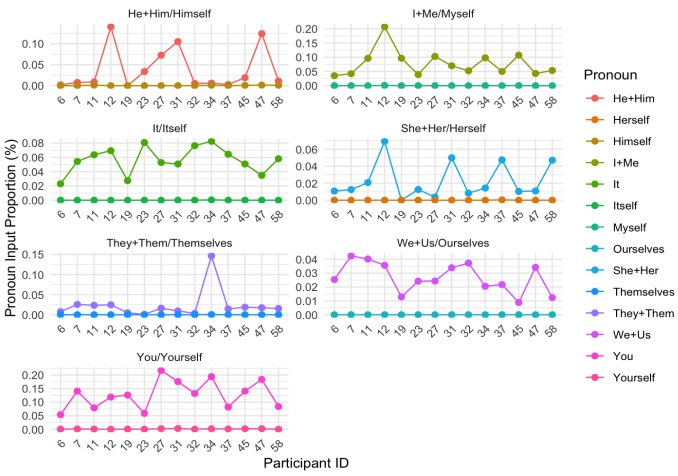
3 To enhance the validity of manually coded datasets, it is customary to engage a second coder to independently analyze 20% to 30% of the dataset, a practice that helps establish inter-coder reliability.

Variability in Families

We found variability in personal and reflexive pronoun usage across individual families. Among the 16 families studied, 11 used the personal pronoun "you" most frequently, ranging from 5.377% to 21.713% of overall parental input (120 to 418 occurrences) over the course of the two-hour video. Two families used the personal pronoun "I/me" most frequently, ranging from 3.517% to 20.693% of overall parental input (209 and 282 occurrences). One family used the personal pronoun "it" most frequently, with 8.248% of total parental input (231 occurrences).

Nine families used the personal pronoun "he/him" the least frequently, ranging from 0% to 14.059% (0 to 26 occurrences) over the course of the two-hour video. Five families used the personal pronoun "they/them" the least frequently, ranging from 0.105%% to 14.652% (from 3 to 30 occurrences). Only one family used the personal pronoun "we/us" the least frequently in the two-hour video domain, with a total of 0.882% input proportion (24 occurrences). It is noteworthy that one family did not use the personal pronouns "he/him" and "she/her" at all during the two-hour video. See Figure 3 for more details of each family's personal and reflexive pronoun use.

Figure 3: *Variability in Families*

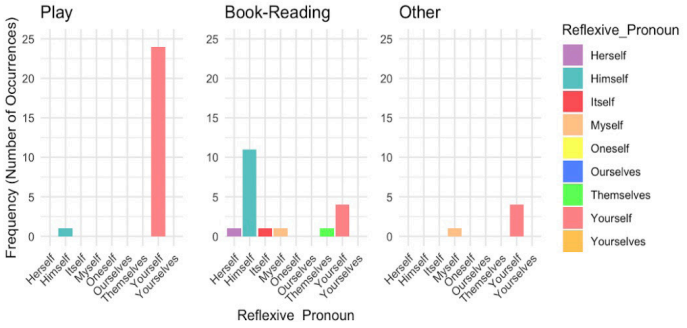


Note. This graph presents the diversity in personal and reflexive pronoun parental input proportion measures
across 14 families, derived from transcript-based analysis. The pronoun input proportion is determined by dividing the total occurrences of each utterance containing the target pronoun by individual participant's total utterances. Each family is depicted as a facet, organized in rows and columns. The x-axis represents each participant's ID, while the y-axis denotes the parental input proportion in percentages.

Activity Context

Second, we examined if there were differences in parents' use of reflexive pronouns in different activity contexts (e.g., play, book reading, other). We found that reflexive pronoun use varied across different activity contexts (Figure 4). In the play context, reflexive pronoun use was most frequent, occurring 55.1% of the total reflexive pronoun usage, followed by book-reading context, which accounted for 34.7% of reflexive pronoun use. The remaining "other" context accounted for 10.2% of reflexive pronoun use. Additionally, "yourself" was the most commonly used reflexive pronoun in the play context (24 occurrences or 92.3% of overall reflexive pronoun use in the play context) and "other" context (4 occurrences or 48.980% of overall reflexive pronoun use in the other context). "Himself" was most commonly used in the book-reading context (11 occurrences or 22.917%of overall reflexive pronoun input proportion).

Figure 4: *Reflexive Pronoun and Activity Context*



Note. From left to right, Figure 2 displays the occurrences of each reflexive pronoun in three different contexts: Play, Book-Reading, and Other. Each bar represents the frequency (number of occurrences) of the respective reflexive pronoun within its context. Reflexive pronouns are visualized in different colors: "Herself" is represented in purple, "Himself" in aqua, "Itself" in red, "Myself" in light orange, "Oneself" in yellow, "Ourselves" in blue, " Yourself" in peach and " Yourselves " in salmon.

Children's Response Coding

Finally, we examined children's understanding of reflexive pronouns in their everyday environments. In the analyses, we paired utterances with a reflexive pronoun and utterances with a personal pronoun of the same content and referent and from the same activity context. Overall, we identified 35 paired-up sentences, including 23 pairs of yourself/you in the play context, 6 pairs of himself/he in the book-reading context, 5 pairs of yourself/you in the book-reading context, 1 pair of herself/she in the play context, and no pairs for himself/he in the play context.

Children responded to all paired-up sentences (e.g., 23 pairs of yourself/you) in the play context, but none in book-reading or other contexts. We observed more behavioral responses compared to verbal responses in the play context. In the play context, children responded behaviorally to the reflexive pronoun, "yourself" 17 times and verbally 13 times.

When the personal pronoun "you" was used in the play context, children responded behaviorally 14 times and verbally 9 times. Across all paired-up sentences, children responded more often to "yourself" (17 times in the overall 23 paired-up sentences, or 73.9%) than to "you" (14 times in the overall 24 paired-up sentences, or 60.9%) in the play context.

Discussion

Variability in Parents' Use of Personal and Reflexive Pronouns

We first examined the occurrences and frequencies of reflexive and personal pronouns in parental input. Overall, across 14 families, personal pronouns were used more frequently than reflexive pronouns. This result aligns with our hypothesis and previous research that found that personal pronouns are more commonly used in the everyday environment compared to reflexive pronouns (Dawson et al., 2021).

Additionally, the results from our first research question are consistent with existing research on pronoun acquisition. We found that the reflexive pronoun "yourself" is acquired before other reflexive pronouns, especially compared to third-personal reflexive pronouns, such as "himself" and "herself" (Wexler & Chien, 1985; Chien & Wexler, 1990). In the current study, children responded more often to "yourself" in the play context and did not respond to "himself" and "herself" in the play or book-reading or in "other" context. This result suggests that the reflexive pronoun "yourself" is acquired earlier or children already know the meaning of "yourself" around the age of two (Wexler & Chien, 1985; Chien & Wexler, 1990; Rozendaal & Baker, 2010).

Also, children responded more to "yourself" in the play context compared to "you" in the play context (73.91% response for "yourself" in the play context and 60.86% response for "you" in the play context). This is interesting because parents' use of reflexive pronouns is drastically lower than their use of personal pronouns in this dataset (Tamis-LeMonda & Adolph, 2017). This finding provides positive evidence that the understanding of reflexive pronouns might be earlier than personal pronouns, since children rarely respond to personal pronouns compared to reflexive pronoun. This could be due to the most frequent reflexive pronoun being "yourself" (N = 32) and the utterances that parents are producing to the children have a more uniform linguistic pattern, as the "yourself" are usually in the object position of a sentence and referring to the subject of the sentence, or, in this study the referents of "yourself" are more unitary (e.g., most of they are usually referring to the child), and this pattern is easier to observe than other reflexive pronouns, such as "himself" (e.g., most of they are referring to various book characters in different story books). This finding aligns with previous work, such as a full reflexive pronoun comprehension typically emerges around the age of five to seven and the reflexive pronoun "yourself" is acquired before other reflexive pronouns (Wexler & Chien, 1985; Chien & Wexler, 1990; Rozendaal & Baker, 2010).

The prevalence of personal and reflexive pronouns can be attributed to multiple factors. First, personal pronouns are frequently used in everyday conversations, leading to higher occurrences in parental input (Dawson et al., 2021). Personal pronouns serve as convenient and efficient means of referring to oneself or others, which means personal pronouns can be used as the simple referent of a person or an object, simplifying communication. For example, instead of saying, "Johnny, could Johnny bring Johnny's mother a plate," people can use personal pronouns to replace the names or people of this conversation, such as "Johnny, could you bring me a plate". Additionally, the grammatical flexibility of personal pronouns allows them to function as both subjects and objects within a sentence. For instance, in English, "He (subject) is doing fine" and "I got this from him (object)" demonstrates the usage of personal pronouns in both subject and object positions. In contrast, reflexive pronouns are limited to the object position when the subject and object share the same referent, as exemplified by the sentence, "Mary's mother bought this present by herself" and it is ungrammatical to use the reflexive pronouns in the subject position, such as "*Herself bought this present" (Trask, 1993). These linguistic rules inherently restrict the occurrence of reflexive pronouns, as they have fewer grammatical functions compared to personal pronouns.

Along with our first research question, we examined the variability in personal and reflexive pronoun usage across different families. Among the 16 families included in the study, distinct patterns emerged regarding the frequency of specific personal pronouns. The personal pronoun "you" was found to be the most frequently used pronoun. The pronoun "he/him" and, in one family, the pronoun "we/us" was used least frequently. These results could be a factor of the limited speakers and listeners in the environment because this corpus is mainly based on parent-children's interactions in a naturalistic play context. In this dataset, only three main characters are presented in the child's environment: the caregiver, the child, and the research assistant (who is excluded from the discourse and interaction; (Tamis-LeMonda & Adolph, 2017). This limitation in the environment explains the predominant occurrences of the reflexive pronoun "yourself" and the personal pronoun "you" in the discourse. These are references the caregivers use when talking to their children, who are the only two speakers included in the interactions. In addition, the different communicative profiles (e.g., individual variability of pronoun usage in different families and parenting styles) between caregiver and child could influence how parents interact with children. This factor could impact the amount of input available to children in their environment and their language acquisition (Rivero, 2012).

Reflexive Pronouns are Context-Dependent

The second research question examined reflexive pronoun use between different discourse contexts. We found that reflexive pronouns were used more frequently in the play context. This finding relates to prior research showing that early language acquisition is predicted by nouns and verbs related

to food and face-to-face interaction (Chang & Deak, 2020). We also found that more complex and diverse reflexive pronouns were used in book-readings than parent-child interactions, which aligns with prior research that finds that book-reading context includes more complex and novel words compared to a child's everyday environment (Dawson et al., 2021).

Parent-child interactions in playtime contexts may explain why we found more use of "you/yourself" in the play context. Not only are more discourses prevalent during mealtime and playtime, but the directive discourse which requires more behavioral and verbal interaction from children is more common during playtime (Wohlwend, 2008; Adi-Bensaid, et al., 2022; Wohlwend, 2022). This direct interaction might benefit children's vocabulary learning through more dynamic interactions with their caregivers and, therefore, more opportunities to hear the pronouns "you/yourself."

Two-Year-Olds Demonstrate Understanding of Reflexive Pronouns

Finally, we asked whether two-year-olds show an understanding of reflexive pronouns in a naturalistic setting. We found that two-year-old children showed more responses and, therefore, may have a better understanding of "yourself" than "you" when it comes to reflexive pronouns in the play context. This finding supports previous work stating that the reflexive pronoun "yourself" is acquired earlier compared to other reflexive pronouns (Wexler & Chien, 1985; Chien & Wexler, 1990). However, children only responded to paired-up sentences in the play context and not in book-reading or "other" contexts. This limitation might be explained by the limited behavioral interactions between the child and caregiver during the book-reading and the "other" contexts, even though research shows that reading picture books is an activity that supports child language development (Farrant & Zubrick, 2013; Bojczyk et al., 2016; Dowdall et al., 2020). The book-reading situations in the current study did not allow for explicit verbal or behavioral responses from children and could not be confidently coded.

In the "other" context, caregivers often referred to a referent that was not physically present in the children's current environment and in utterances that are not directly addressed to the child. Even though children can learn from overheard conversations (e.g., Akhtar et al., 2001), they may not be explicitly responding to pronouns because they are not directly addressed in this study. Therefore, this may explain why no verbal or behavioral responses are observed from the children when pronouns are used in the "other" context.

While the current study cannot definitively resolve the discrepancies in reflexive pronoun acquisition, our results do show that partial understanding of reflexive pronouns is observed in 2-year-olds children from a naturalistic observation approach, and some reflexive pronouns (e.g., yourself) have more verbal or behavioral responses than other reflexive pronouns (e.g., himself). Our data would partially support both the syntactical approach (e.g., children show an understanding of reflexive pronouns around 2 to 3 years old) and the pragmatics approach (e.g., a full understanding of reflexive pronouns are shown around 5 to 7 years old).However, our data is heavily context-dependent, and future research should continue to examine this debate in order to resolve the debates in reflexive pronoun acquisition.

Significances and Real-World Implications

Our findings hold significant implications for both theoretical frameworks and educational practices in language acquisition. Introducing more reflexive pronouns into everyday play settings through interactive methods has the potential to enhance children's understanding of pronouns and enrich their overall language learning experience (Wohlwend, 2008; Adi-Bensaid, et al., 2022; Wohlwend, 2022). Given children's inclination towards learning through active, playful engagement, educators may find it beneficial to incorporate more interactive activities into children's academic endeavors (Wohlwend, 2022; Prins et al., 2023). This approach not only fosters language development but also emphasizes the pivotal role of real-life, interactive experiences in language acquisition. By creating an environment abundant in reflexive pronouns and promoting dynamic interactions, educators can facilitate a deeper comprehension of language structures among young learners.

Limitations and Future Directions

The current study included a small, homogenous sample of families, which limits the generalizability of the findings. To address this limitation, future research should aim to extend these findings to different cultures and populations, examining pronoun usage and acquisition in a more diverse sample. This would provide a broader understanding of how pronoun acquisition unfolds across different linguistic and cultural contexts and help identify potential cultural and environmental influences on pronoun usage.

Additionally, this study focused on two-year-old children and their understanding of personal and reflexive pronouns. Future research should explore the developmental trajectory beyond this age range to gain a more comprehensive understanding of pronoun acquisition from a longitudinal perspective. Examining how pronoun usage and comprehension evolve as children grow older would provide insights into the progression and milestones of pronoun acquisition. Longitudinal studies that follow children over time would be particularly valuable in capturing these developmental changes. For clinical assessments, it is notable to design interventions for children who are having difficulties in learning reflexive pronouns.

Moreover, the study touched upon the influence of different contexts on pronoun usage, particularly in the play context. However, future research should delve deeper into the role of various contextual factors in shaping pronoun acquisition. Investigating how different environments, social interactions, and activities impact pronoun usage could help uncover

the mechanisms underlying the acquisition process. For example, studying how pronouns are used and understood in educational settings, family conversations, or other specific contexts would provide a more nuanced understanding of pronoun development.

By addressing these future directions, researchers can expand on the current study's findings and contribute to the broader field of language acquisition. Considering a more diverse sample, exploring the developmental trajectory, and examining contextual factors will enhance our understanding of how children acquire and use pronouns, and their findings can inform educational practices and intervention strategies, and contribute to the broader field of linguistics.

Conclusions

In conclusion, this study investigated the usage and acquisition of personal and reflexive pronouns in early language development within a naturalistic environment. The findings revealed several important insights into pronoun usage patterns and children's understanding of reflexive pronouns.

The results contribute to understanding pronoun usage and acquisition in early language development. They shed light on the prevalence and functions of personal pronouns, the limited occurrence of reflexive pronouns, and the differential understanding of reflexive pronouns by two-year-old children. These findings have implications for language acquisition theories and highlight the importance of contextual factors in shaping pronoun use and comprehension. Future research can build upon these findings by further exploring the developmental trajectory of reflexive pronoun acquisition, investigating the role of different contextual factors in pronoun usage, and expanding the study to a larger and more diverse sample. By deepening our understanding of how children acquire and use pronouns, we can gain valuable insights into the mechanisms underlying early language development and provide a foundation for improving language teaching strategies.

Acknowledgements

I am deeply grateful to the UCLA/KECK foundation for providing scholarship; Dr Sandhofer, Emily Neer and Erjing Zhang for their guidance and help; all members of the LCD lab for their comments and suggestions; the NYU researchers who collected the data for The Science of Everyday Play dataset in Databrary and the families who participated in this study.

References

Adi-Bensaid, L., Sela, T., & Tubul-Lavy, G. (2022). The context matters: The use of communicative intentions by mothers to their children during playtime and mealtime. Infant Behavior & Development, 69, 101778–101778. https://doi.org/10.1016/j.infbeh.2022.101778

Akhtar, N., Jipson, J., & Callanan, M. A. (2001). Learning words through overhearing. Child Development, 72(2), 416–430. https://doi.org/10.1111/1467-8624.00287

Berk, S., & Lillo-Martin, D. (2012). The two-word stage: Mo tivated by linguistic or cognitive constraints? Cogni tive Psychology, 65(1), 118–140. https://doi.org/10.1016/j.cogpsych.2012.02.002

Bohn, M., Nha Le, K., Peloquin, B., Köymen, B., & Frank, M. C. (2020). Children's interpretation of ambiguous pronouns based on prior discourse. Developmental Science, 24(3). https://doi.org/10.1111/desc.13049

Bojczyk, K. E., Davis, A. E., & Rana, V. (2016). Mother–child inter action quality in shared book reading: Relation to child vocabulary and readiness to read. Early Childhood Re search Quarterly, 36, 404–414. https://doi.org/10.1016/j.ecresq.2016.01.006

Chang, L. M., & Deák, G. O. (2020). Adjacent and Non-Adja cent Word Contexts Both Predict Age of Acquisition of En glish Words: A Distributional Corpus Analysis of Child-Directed Speech. Cognitive Science, 44(11). https://doi.org/10.1111/cogs.12899

Chien, Y.-C., & Wexler, K. (1990). Children's Knowledge of Lo cality Conditions in Binding as Evidence for the Modular ity of Syntax and Pragmatics. Language Acquisition, 1(3), 225–295. https://doi.org/10.1207/s15327817la0103_2

Contemori, C., & Tortajada, F. (2020). The use of social–com municative cues to interpret ambiguous pronouns: Bilin gual adults differ from monolinguals. Applied Psy cholinguistics, 41(1), 51-77. https://doi.org/10.1017/S0142716419000407

Dahl, & Tran, A. Q. (2016). Vocal tones influence young children's responses to prohibitions. Journal of Experimental Child Psychology, 152, 71–91. https://doi.org/10.1016/j.jecp.2016.07.009

Dawson, N., Hsiao, Y., Banerji, N., Tan, A. W. M., & Nation, K. (2021). Features of lexical richness in children's books: Comparisons with child-directed speech. Language De velopment Research.

Deen, K. U., & Becker, M. (2020). Language Acquisition and De velopment: A Generative Introduction. MIT Press.

Dowdall, N., Melendez-Torres, G. J., Murray, L., Gardner, F., Hart ford, L., & Cooper, P. J. (2020). Shared Picture Book Reading Interventions for Child Language Development: A Sys tematic Review and Meta-Analysis. Child Development, 91(2). https://doi.org/10.1111/cdev.13225

Farrant, B. M., & Zubrick, S. R. (2013). Parent–child book reading across early childhood and child vocabulary in the early school years: Findings from the Longitudinal Study of Australian Children. First Language, 33(3), 280–293. https://doi.org/10.1177/0142723713487617

Grodzinsky, Y., & Reinhart, T. (1993). The innateness of binding and coreference. Linguistic Inquiry, 24, 69–101. http://www.jstor.org/stable/4178802

Hu, Torr, J., Wei, Y., & Jiang, C. (2021). Mealtime talk as a lan guage learning context: Australian Chinese parents' lan guage use in interactions with their preschool-aged chil dren at the dinner table. Early Child Development and Care, 191(3), 415–430. https://doi.org/10.1080/03004430.2019.1621862

Hill, T. , & Wagovich, S. A. (2020). Word learning from context in school-age children: relations with language ability and executive function. Journal of Child Language, 47(5), 1006–1029. https://doi.org/10.1017/S0305000919000989

Hills, T. (2013). The company that words keep: Comparing the statistical structure of child- Versus adult-Directed lan guage. Journal of Child Language, 40(3), 586–604. https://doi.org/10.1017/S0305000912000165

Hills, T., Maouene, J., Riordan, B., & Smith, L. B. (2010). The as sociative structure of language: Contextual diversity in early word learning. Journal of Memory & Language, 63(3), 259–273. https://doi.org/10.1038/jid.2014.371

Hills, T., Maouene, M., Maouene, J., Sheya, A., & Smith, L. (2009). Longitudinal analysis of early semantic net works: Preferential attachment or preferential acqui sition? Psychological Science, 20(6), 729–739. https://doi.org/10.1111/j.1467-9280.2009.02365.x

Klein, S. & Becker, B. (2017). Preschools as language learning environments for children of immigrants. Differential ef fects by familial language use across different preschool contexts. Research in Social Stratification and Mobility, 48, 20–31. https://doi.org/10.1016/j.rssm.2017.01.001

Lewis, S. (2022). Descriptions, pronouns, and uniqueness. Linguistics and Philosophy, 45(3), 559–617. https://doi.org/10.1007/s10988-021-09325-y

MacWhinney, B. (2000). The CHILDES project: Tools for ana lyzing talk: Transcription format and programs (3rd ed.). Lawrence Erlbaum Associates Publishers.

McKee, C. (1992). A Comparison of Pronouns and Anaphors in Italian and English Acquisition. Language Acquisition, 2(1), 21–54. https://doi.org/10.1207/s15327817la0201_2

Meltzer-Asscher, A. (2021). Resumptive Pronouns in Lan guage Comprehension and Production. Annual Re view of Linguistics, 7(1), 177–194. https://doi.org/10.1146/annurev-linguistics-031320-012726

Oshima-Takane, Y. (1988). Children learn from speech not ad dressed to them: the case of personal pronouns. Journal of Child Language, 15(1), 98-108. http://journals.cambridge.org/abstract_S0305000900012071

Prins, J., van der Wilt, F., van Santen, S., van der Veen, C., & Hovinga, D. (2023). The importance of play in natural en vironments for children's language development: an ex plorative study in early childhood education. International Journal of Early Years Education, 31(2), 450–466. https://doi.org/10.1080/09669760.2022.2144147

Rivero, M. (2012). Form-function rules in the first words stage: A longitudinal study of two children. Anuario de Psicología, 1, 65-84.

Rozendaal, M., & Baker, A. (2010). The acquisition of reference: Pragmatic aspects and the influence of language in put. Journal of Pragmatics, 42(7), 1866–1879. https://doi.org/10.1016/j.pragma.2009.05.013

Stern, N. (2022). Reflexivity, Role Conflicts, And The Meaning Of English Self Pronouns. Manuscrito, 45(1), 90–116. https://doi.org/10.1590/0100-6045.2022.v45n1.ns

Tamis-LeMonda, C., & Adolph, K. (2017). The Science of Every day Play. Databrary. Retrieved February 9, 2023, from http://doi.org/10.17910/b7.563

Trask, R. L. (1993). A Dictionary of Grammatical Terms in Lin guistics. Routledge.

Truswell, R. (2014). Binding theory. In The Routledge hand book of syntax (pp. 214-238). Routledge.

Wales, K. (1996). Personal pronouns in present-day English. Cambridge University Press.

Wexler, K., & Chien, Y.-C. (1985). The Development of Lexical Anaphors and Pronouns. Child Language Development, 24(1), 138-49. https://files.eric.ed.gov/fulltext/ED261549.pdf

Wohlwend, K. E. (2008). Play as a literacy of possibilities: Ex panding meanings in practices, materials, and spaces. Lan guage Arts, 86(2), 127–136.

Wohlwend, K. E. (2022). Serious play for serious times: Recen tering play in early literacy classrooms. Read. Teach. 2023, 76, 478–486.

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Allison graduated from University at Albany in May 2024 with a Bachelor of Arts in psychology, and minors in Spanish, sociology, and criminal justice. As an undergraduate, she served as a research assistant in Dr. Jeannette Altarriba's Cognition and Language Laboratory, focusing on information processing and working memory. She currently serves as a project assistant for the New York State Department of Health, participating in surveillance research and data quality improvement on congenital birth defects across New York. Allison will be continuing her education at the University at Albany to obtain a master's degree in public health.

Was there a particular experience that sparked your research interests?

I would not say a singular experience sparked my interest in research. I am grateful to have been able to involve myself within the Cognition and Language Laboratory, as it allowed me to branch out and discover different fields I was interested in studying. I engaged in such a diverse range of courses during my undergraduate career, which granted me the opportunity to explore various research interests, ultimately leading me to want to take that spark further into graduate school within public health.

Who has been the most influential person in your life?

There are many people that have made an impact on where I am today, but it ultimately comes down to my parents' endless support that has consistently guided me in my professional and personal life, showing me firsthand the essence of leading by example.

What is your greatest accomplishment?

I believe having the privilege to attend graduate school and continue working towards a career in research is my greatest accomplishment. After completing my undergraduate studies one year early with highest honors and having the opportunity for my work to be published, I am confident that my accomplishments thus far will serve as a foundation for my future endeavors.

Where do you see yourself in 10 years?

In 10 years, I see myself upholding a career in public health research. My current work for the state has been incredibly guiding, and I wish to continue on a similar path. Specifically, I would like to conduct research that bridges both psychology and public health in neuroepidemiology, focusing on maternal and child health.

The Mental Representation of Emotion and Emotion-Laden Words Within and Across Languages: Evidence from Studies of Acquisition and Word Processing

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Acknowledgments

Thank you to my supervisor, Dr. Jeanette Altarriba, who has assisted me tremendously and made this review possible. Her guidance has aided me through every stage of this paper, and I thank her for her incredible advice and encouragement. I also wish to extend my thanks to my friends, and especially my family, who have been nothing shy of encouraging and supportive throughout this process.

Language and emotion are intricately articulated, influencing the cognitive statuses of processing involving emotion and emotion-laden words. The field of psycholinguistics frequently analyzes these processes in either foreign or second language contexts, but there is a gap in the present literature that directly compares the two measures. This literature review aims to explore the recognition and interpretation of emotion-related words in second language speakers and foreign language learners in order to provide insight to their implications in real-life scenarios. Both native and non-native speakers express distinct cognitive mechanisms when facing emotional content, revealing language's impact on decision-making, memory, and perception. By reviewing distinctive factors such as differences in processing, acquisition, and current psychological measures, this review contributes to understanding the impact language context has on individuals across diverse linguistic and cultural backgrounds. This paper facilitates a comprehensive view into the dynamics involved in the processing of emotion and emotion-laden words, as the latter is overlooked in current studies., to aim to employ more effective communication strategies for practical applications, particularly within health communication or legal proceedings. Explaining why these differences exist presents a challenge, in that it is the unconscious mind of learners and speakers that drive responses, thus revealing an overarching theme I aim to convey throughout this review.

Key Words: emotion processing, language context, mental acquisition, psycholinguistics

Introduction to Exploring Emotion and Emotion-Laden Words

Definitions, Examples, and Differences

The examination of emotion and emotion-laden words serves as a facet for further understanding the relevance of linguistic studies. Within this realm, a significant distinction is present when defining an emotion word as opposed to an emotion-laden word. Emotion words, exemplified by terms like "happy", "sad", or "angry", express particular affective states. Contrary to this, emotion-laden words, such as "sunshine", "death", or "birthday", have the potential to evoke an emotional state, without directly having an affective connotation (Zhang, 2017). However, the classification of "emotion words" brings upon a debate of being too ambiguous of a term, as emotion-laden words, despite having their own distinction, fall under this same category. Consequently, "emotion words" may also be referred to as "emotion-label" or "emotionally-charged" words by various researchers.

Considering such intricacies, the valence of words, whether emotion-label or emotion-laden, presents a crucial role when studying foreign and second language processing. Warriner's (2013) research notes that valence is the most central domain and is vital due to its generalizability across languages in studying emotion-related processes. Valence refers to the level of

pleasantness evoked by an emotion word, ranging from positive to negative. For example, "miserable" is likely to elicit a stronger, negative valence in comparison to "glum." Conversely, arousal relates to the amount of emotional intensity evoked by a word. For instance, the word "depressed" typically elicits more arousal than using a softer term such as "sad." The final condition regarding emotional ratings is dominance, which is defined as the degree of control exerted by a stimulus. This feature can be exemplified when comparing "depressed" versus "sad" once more (Warriner, 2013). "Depressed" holds a higher level of power than "sad," showcasing a more intense level of the said emotional state, common within experimental linguistic studies.

Additionally, how abstract or concrete a given word is impacts their technical definition. Concrete words refer to tangible nouns that physically exist, such as "pencil", while abstract words tend to refer to more subjective concepts, such as "kindness". These descriptors can cross-correlate with emotional perception, with words like "coffin" being more emotionally concrete and "love" being more emotionally abstract.

It is important to make note that not all studies include each of the above factors in their procedures, and researchers may elect to employ only specific elements to focus on depending on their research objectives. Considering which features are utilized most in studies that involve language acquisition and cognition of foreign or second languages, may elicit different results. These findings need to be cross-referenced to come to a formal conclusion regarding emotion processing among the opposing speaker types. All the above factors therefore collectively contribute to how speakers interpret emotional information through mental representations, ultimately affecting perception and their respective connotations.

Indication of Processing Differences

Understanding the distinct levels of cognitive processing is fundamental when exploring emotion-focused psycholinguistics. Though we have become aware that both emotion-label and emotion-laden words are structurally similar, their unique characteristics significantly affect how we perceive them mentally. The nuances set by these categories allows for researchers to uncover the intricacies of communication in foreign and second languages.

Kazanas and Altarriba (2016) note significant differentiation in processing through means of valence when presenting participants with a lexical decision task (LDT). In an LDT, participants are presented with a single word on a screen and must determine if the given word exists in a given language. With reference to neuroimaging and response time analysis, a clear pattern is uncovered in that emotion-label processing occurs more rapidly than emotion-laden processing. This trend is particularly prevalent among foreign language learners, whose response times were fastest when presented with positive emotion-label words and slowest with negative emotion-laden words. Aside from perception, the ranges of positive and negative valence also impacts word recognition and their existence in one's native language. Therefore, the effect of valence on word recognition suggests that positive words may have stronger mental representations, with consequent response speeds and later decision-making.

Similarly, a prior study considered both explicit and implicit cognitive processing when comparing response times for emotion and emotion-laden words. This investigation utilized a masked lexical decision task, in which participants were primed with the presentation of a word or nonword before the target word. The employment of this aims to impede explicit processing and eliminate any strategizing from the participant in case they become aware of the general patterns of the study (Kazanas & Altarriba, 2015). Explicit processing in this essence refers to the conscious decision of electing if the target word really exists, thus aims of these studies tend to analyze the unconscious and gain the fastest response time with minimal forethought involved. In the context of a masked lexical decision task, Kazanas and Altarriba (2016) uncovered results consistent with that of the traditional lexical decision task, in which emotion-label words are processed faster than emotion-laden distinctions. Kazanas and Altarriba (2015) also confirmed the initial finding that positively-valenced words are processed faster and more accurately than their negatively-valenced counterparts.

Moreover, masked or unmasked lexical decision tasks are not the sole methods for unraveling explicit or implicit cognitive processing techniques. Various linguistic testing procedures, such as emotional categorization tasks (ECT) or emotional Stroop tasks (EST), delve further into the cognitive mechanisms involved in word processing. ECT involves the explicit processing of emotional content within stimuli, such as through judgment of valence, whereas EST relates to the implicit processing of such stimuli, often involving responses to congruency of a presented word and its meaning (Liu et al., 2022). Results from studies involving these tasks that examined the differences of processing in emotion and emotion-laden words align with previous findings in that response times were quicker with emotion-label words. Liu et al. (2022) revealed that emotion-label words heighten the use of the automatic cognitive system with little effort, whereas emotion-laden words utilize the reflective system, needing extra effort. The present commonality of results serves as a reinforcing indicator that a significant processing difference does exist for both word types.

The Acquisition of Emotion & Emotion-Laden Words

Studies Involving the Learning of These Word Types

Studying the acquisition of emotion-label and emotion-laden words in monolingual individuals offers a glimpse of the dynamics involved in psycholinguistics. The way in which individuals navigate the complexities of comprehending words presented in a foreign language allows for researchers to understand implications involved in acquiring specific vocabularies in a non-native condition.

The intersection of emotion and language for foreign language learners is heavily dependent on the context in which they are presented. Research involving recognition and retention of emotion-label and emotion-laden word stimuli poses that providing context of information to participants prior to stimuli presentation yields significant effects. Emotional stimuli in a second language should be presented within a written, visual, or spoken context that ties to the positive or negative valence of that word (Altarriba & Basnight-Brown, 2012). Implementing this method of instruction serves as a retrieval cue, potentially improving later recall of the target stimuli. Behavioral data involving the accuracy of recall show that emotion-laden words are more accurately recognized than emotion-label words, specifically more present in positively-valenced words (Zhang et al., 2020). These data can be attributed to enhanced activation of cognitive processes that elicit participants to consider the meaning of a word on a deeper and more subjective level.

The use of positive or negative contextual narratives holds the potential for varying levels of recall. Driver (2022) discovered that negatively-valenced emotion-laden texts that had real-life relevance triggered more emotional responses overall, as well as heightened levels of retention and recall after the study was completed. Observing a conceptual equivalence of a negative turn of events or intense emotions, such as anger or fear, in a visual stimulus can produce a greater generation of related adjectives, as opposed to the viewing of a positive or enjoyable event (Pavlenko, 2008). These findings contrast against the previous assumption that positive words are generally processed more accurately than negative ones in a native context.

Prompting participants with contextual background is one of the strategies involved in examining foreign language learners and their word processing abilities. Lexical availability tasks base word associations with semantic categories, such as animals, foods, or hobbies (Jiménez Catalán & Dewaele, 2017). These categorical stimuli are used to elicit words from the speaker's mind, as they are not frequently used in their native language but rather are primarily applied to communicate ideas and feelings relative to a situation or daily activity. Researchers present a list of words and have participants write down as many available words that come to mind as they can. Emotion-label or emotion-laden prompts elicit the highest number of responses in a native language, whereas neutral words generate the fewest words. The lexical availability task accommodates for levels of exposure foreign language learners are subjected to regarding emotion-related words or phrases, with the concreteness and valence of such likely explaining the difference in quantity of responses.

Additionally, self-assessment manikins (SAM) involve visual representations of non-human faces ranging from extremely elated to profoundly unhappy. Foreign language learners meet the task of associating a presented word, often in narrative form in both their native and foreign language, with a corresponding face based on their subjective judgment of the stimuli's pleasantness, or valence. Milanović (2019) highlighted that positive emotion-laden words were of higher pleasantness in a first language than in a foreign language, despite holding the same contextual meaning. Although different methods were utilized, these findings can compare to those of Jiménez Catalán and Dewaele (2017) in terms of levels of familiarity in exposure.

A common thread in the aforementioned descriptors is the vital role that context and familiarity of words in a language being learned play in research findings. Results tend to vary from one study to another, considering the methods being proposed. While these may not be the most employed procedures in the discipline of psycholinguistics, their opposing perspectives can contribute to a broader understanding of the value background plays in the process of learning a new language.

Utilized Methods in Language Acquisition

Stroop Task and Facial Recognition.

The traditional Stroop task involves identifying the color of a word as quickly as possible while ignoring the descriptive meaning of the stimuli (McWilliam et al., 2009). Typically, these words are names of colors, with the text color either matching (congruent) or conflicting (incongruent) with the word itself. Participants tend to have slower response times when they are presented with incongruent pairings (e.g., the word "red" printed in blue ink), thus referred to as the Stroop effect. Modifications have been made to adapt to psycholinguistic studies, incorporating both concrete or abstract emotion-related words. Altarriba and Basnight-Brown (2012) exemplified a key relationship in cognitive processing, in that emotion-label words (e.g., "scared") were processed faster and more accurately when congruent than their concrete (e.g., "ankle") or abstract (e.g., "virtue") counterparts by foreign language learners. In contrast, a recognition Stroop task was conducted to compare participant's accuracy in matching translations of emotion-label words in native and foreign languages, to which responses were significantly slower. This interference may be due to the limited emotional vocabulary of developing second language learners, despite a high cognitive response still enduring.

Another variant of the Stroop task involves the matching of faces with their corresponding emotional expression, such as with self-assessment manikins.Tasks such as affect labeling (e.g., matching facial expressions with emotion-label descriptors) and affect matching (e.g., matching one emotional face to a similar one depicting the same emotion) exhibited the slowest response times in foreign language learners (Vives et al., 2021). This difficulty is likely attributed to levels of uncertainty in responses, which arise when attempting to navigate common facial expressions known in both languages, but encountering difficulty when assigning the facial expression to a corresponding label in a non-native language.

This methodology and its corresponding variations can provide insights into the cognitive processing emotion-related

by highlighting the challenges of emotional expression and recognition, primarily in a non-native language. The Stroop task reveals the intricacies involved in navigating emotional expressions, suggesting that foreign language learners may struggle to convey emotional meaning in their second language and consequently impacting their ability to fully grasp specific emotional communication.

Physiological Responses. The way our minds and bodies respond to the presentation of emotionally-charged stimuli contributes to the intricacies of psycholinguistic study. A key measurement of skin conductance involves placing electrodes on participants' body parts to capture waves relative to skin conductance responses through sweat content. For instance, Caldwell-Harris and Ayçiçegi-Dinn (2009) utilized this approach by placing electrodes on the fingers of second language learners, while assessing arousal in written rating responses regarding the presentation of emotion-label or emotion-laden words. Skin conductance measures are helpful for denoting arousal, as higher sweat contents are present in more intense situations. Their research uncovered that the reading of insults, reprimands, or endearments elicited the strongest skin conductance responses in participants' native language. Interestingly, endearing words and phrases showed the highest amount of overall arousal from electrode data, highlighting that positive stimuli generally evokes strong reactions in second language learners.

Eye-tracking data has also provided valuable insight into the scope of the acquisition and processing of words in a second language. Pupil sizes are sensitive to levels of pleasantness and intensity to presented stimuli presented in a real-world setting, particularly involving highly emotional content. Levels of pupil dilation are greater in response to largely valenced and arousing emotional stimuli, which aids in exploring the relationship between language and emotion in native and foreign language processing (Iacozza et al., 2017). These researchers found evidence that a present advantage in emotional content processing in one's native language led to greater and more rapid pupillary responses. Their findings suggested that autonomic physiological responses were reduced in foreign language groups, revealing some form of gap between processing emotionally-charged words in native and second languages.

Additionally, Zhang et al. (2020) and Liu et al. (2022) investigated brain wave activity through electroencephalogram analysis which reveals a contrast in the aforementioned results. Opposingly, negatively-valenced stimuli elicited higher amounts of brain wave activity than a positive counterpart. The researchers provide that explaining this relationship could be through the idea of negative emotion-label and emotion-laden stimuli emulating ideas of threat or fear, rather than positive traits regarding safety or joy. These conclusions align with the previous idea that ideas of fear are associated with greater brain-wave activity due to its negative connotation, as opposed to its positive counterpart.

Word Recall. The study of the brain's capacity to retain and recall presented information is a significant focus within psycholinguistics as the strength of retrieving emotion-related information is linked to how it is presented and the context of study. Arriagada-Mödinger and Ferreira (2022) conducted research that subjected second language learners to auditory video clips containing an equal number of positive, negative, and neutral emotionally-valenced target words. Similarly, Macedonia and Klimesch (2014) implemented audio-visual stimuli in which participants had to read, listen to, and discuss the words they were exposed to. Retention advantages were present with higher accuracy and faster recall response times for positively-valenced emotion-laden words, such as "precious", "healthy", or "vibrant" (Arriagada-Mödinger & Ferreira, 2022). The acquisition of words and phrases in a second language from an audio-visual context has greater short-term benefits, but recall may begin to decline in a more long-term setting if not consistent (Macedonia & Klimesch, 2014). This insight is valuable in the context of learning a second language in educational settings, in that new knowledge must continue to be reinforced to result in expanded retention.

As shown, studies present mixed findings on whether positive or negative emotion-related words are remembered more accurately. Differences in such contribute to semantic processing that facilitates the varying outcomes across studies. Emotion-related words generally result in greater accuracy of recall as compared to their non-emotional semantic counterparts, with positive emotion-label words responded to most rapidly (Kanazawa, 2021). Deeper processing advantages are present in emotion-related stimuli, as evident in rates of retention during recall tasks, which can facilitate how accurately and distinctively words are retained in second language learners. Additionally, methods of study result in the most effective processing strategies, aiding in developing effective language instruction methods that account for educational settings and presentation of content.

Outcomes Reflecting Similar or DIfferent Acquisitions

Summarizing research on second language acquisition in monolinguals reveals a diverse range of cognitive processes at play. Psycholinguistic studies aim to articulate more intricate explanations for the acquisition of a second language in previous monolinguals, considering other variables of age onset, cultural background, or societal norms. Utilizing Stroop tasks, facial recognition analyses, neurological measures, and tests of retention, researchers gain valuable insight into the scope of learning emotion-related word stimuli. The valence of these words, whether positive or negative, triggers distinct responses in second language learners. Present uncertainty among monolinguals and their capability to perform well in such tasks can be reduced through providing context in experimental situations. Individuals often internally feel the emotion as they are labeling it, thus stressing the importance of exposing second language learners to background knowledge to strengthen the retrieval of sensory information and conceptual knowledge (Vives et al., 2021). Additionally, feelings of

uncertainty propose an idea of heightened emotionality as the aforementioned studies show that participants typically hold more emotional reactivity in their native language, particularly to negative emotion-related words. In reference to Caldwell-Harris and Ayçiçegi-Dinn (2009), monolinguals demonstrated a greater intensity of responses when presented with insults, taboo words, or reprimands. These findings can extend to real-life scenarios, shedding light on the function of performance anxiety, lying, and overall communication dynamics

Research Regarding Bilingual Individuals Already Fluent in an L1 and L2

Differentiation in Processing

The variation in processing of emotion-related stimuli in bilingual individuals fluent in multiple languages carries significant differences from that of monolinguals. The aforementioned examination of foreign language learners revealed diverse outcomes, in that certain word types were remembered, recognized, or carried greater intensity, with high dependence on the word's valence and presentation context. Contextual relevance also plays a vital role concerning the emotional processing of second language speakers. Research has revealed that there are duller levels of arousal present in a second language that was acquired later in life (Nook & Champoux-Larsson, 2022). Ayçiçegi-Dinn and Caldwell-Harris (2009) highlighted that topics of personal significance, taboo phrases, and common reprimands are reported to induce heightened reactivity when encountered in a first language. These findings elicit the need to study the relatedness of interactions between psycholinguistic and cognitive variables. The factor of personal significance having a large influence over semantic representation of words in bilingual speakers could be accounted for by cultural nuances in a linguistic sense. Given this, there is much complexity behind the studies of the connection between linguistics, emotion, and culture.

It is worth noting that when bilingual participants do not focus on the emotionality of emotion-label or emotion-laden words, they exemplify a superiority in recalling positively-valenced terms (Ferré et al., 2013). This distinction can explain the heavy influence regarding personal significance upon engaging with presented phrases. Deweale's (2016) research provides a clearer model through tasking bilingual participants with a rating experiment of swear words. These expressions are widely regarded as taboo, and participants were told to respond according to their levels of offensiveness. The researcher gathered a consensus from participants in that the majority of those who rated high offensiveness stated that it was highly dependent on the situation they were reading the words in, as well as the frequency of their own use. Discussing these findings emphasizes that bilingual people carry more emotionality in their first language, likely due to longer exposure to subjectively offensive words.

Experimental studies exploring the variation of response times and accuracy in matching tasks comparable to monolinguals and bilinguals found little discrepancies. Bilingual speakers tended to exhibit no significant difference in recall speed and accuracy of responses in their dominant or second language (Nook & Champoux-Larsson, 2022). Ferré (2013) additionally argued that memory of emotional stimuli also remains highly consistent across first and second languages. It can be concluded that the processing of such words remains constant across languages of bilinguals, primarily dependent on the contextual and personal significance of the presented stimuli that significantly influences research outcomes.

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Utilized Methods for Bilingual Individuals in L1 and L2

Stroop Task and Facial Recognition. The previous study conducted by Liu et al. (2022) exemplified the cognitive mechanisms involved in an emotional Stroop task (EST) with congruent word description matching. Although the initial study was conducted on monolinguals in their native language, the underlying factors of implicit processing of emotional content persists in research exploring the minds of bilingual speakers.

More recent psycholinguistic studies have adopted the investigation of motor responses involved in Stroop tasks. However, the facet of emotion-related words presented in a second language eliciting different levels of sensorimotor responses was disproved by Dudschig et al. (2014). Their findings revealed that words in a second language (L2) referring to positive or negative emotional states automatically activates motor responses, an upward or downward arm movement, parallel to those in a first language (L1). This was attributed to the exposure to second language words that may automatically activate comprehension in L1, and thus bring a nearly equal trigger of an experiential motor association.

Additionally, facial recognition studies seek to further compare the level of automatic cognitive processing in bilinguals. Accuracy and response times in matching the congruence of faces alongside emotion-label words was more dominant in the first language, resulting in a stronger Stroop effect (Fan et al., 2018). The automatic activation of emotional arousal was weaker in a second language, primarily applicable among late bilingual speakers – those who acquired their second language around early adolescence. However, Nook and Champoux-Larsson (2022) presents an opposing view, in that focusing on the non-linguistic cues of faces does not prompt any significant difference in response times or accuracy between first and second language. These results contradict the preconceived concept of emotional resonance, where bilingual individuals report dulled levels of arousal in their second language rather than their first.

Physiological Responses. Monolingual and bilingual individuals both undergo a complex level of cognitive processing when encountering emotion-label and emotion-laden stimuli in their first or second language. Sianipar et al. (2015) investigated the intensity of such by measuring brain wave activity, similar to Zhang et al. (2020) and Liu et al. (2022), who analyzed event-related potentials (ERPs), small brain voltages activated according to specific stimuli, in second language

learners. After engaging in a lexical decision task involving emotion-laden stimuli, participants showed greater sensitivity to congruence and incongruence in their second languages. The researchers explained this link through the storage of emotional word qualities established from their native languages, suggesting an idea of connectedness between linguistic and emotional representations. These physiological findings highlight the complex relationship shared between language and emotion processing, which emphasizes the role of cognitive structures utilized across multiple language contexts.

A study by Conrad et al. (2011) was of similar nature, but rather used electroencephalogram (EEG) data. These data are more continuous measures of brain activity, while ERPs are more segmental and typically pick up sensory and cognitive changes. Positive, neutral, and negatively-valenced emotion-label words were rated by participants on a seven-point scale following a lexical decision task. The speed of responses and spikes in brain wave activity were elicited quicker in negatively-valenced stimuli in a first language, primarily on the F3 electrode corresponding to the medial prefrontal cortex. This brain region is specifically involved in memory and recall that is highly dependent on context and is consistent in showing greater activation upon retrieving negative stimuli (Kuchinke et al., 2006). The researchers argue that negative words were processed at a more rapid rate due to perceived threat in the stimuli, relating possible attentional bias. However, response times in the second language did not show significant delays, which thus reveals a complex interaction in the cognitive mechanisms involved in emotional word processing of bilingual speakers.

Narratives and Auditory Stimuli. As suggested by previous studies, the way stimuli is presented significantly influences the outcomes of psycholinguistic studies. Experiments regarding recall and retention are less prevalent in bilingual research due to their familiarity with words in the second language, therefore, such studies tend to focus on reading or listening to narratives.

Research done by Ayçiçegi-Dinn and Caldwell-Harris (2009) employed a word association task, where participants were assigned to read a list of displayed words in one language and then audibly produce as many related words as they could within a short timespan. Their results suggested no significant language differences between interaction of positive or negative emotion-related categories, indicating that emotion-memory in bilingual participants remains consistent. Similarly, Hsu et al. (2015) tasked participants with reading current literature passages containing target words that elicited joy or fear. Analyzing participants' brain activation revealed that the processing of emotional texts was also generally similar across languages, but bilingual individuals exhibited more brain wave activity when presented with fear-related stimuli.

A method containing auditory stimuli through video recordings varying in emotional tone of voice, facial expressions, and hand gestures was utilized by Brase and Mani (2017). After viewing the videos, participants had to learn novel words and their definitions and engage in a sentence completion task to assess their ability to apply their emotion-memory by filling in blanks. Results indicated that bilingual speakers performed slightly worse when placing neutral words in their first language sentences but scored equally for negative and neutral stimuli in their second language. This was attributed to relative familiarity of the stimuli. The words the researchers presented were uncommon in either language, potentially enhancing levels of attention and memory activation present when applying newer knowledge.

Processing Outcomes in L1 vs. L2

In summarizing the psycholinguistic studies regarding bilinguals speakers' cognitive responses to emotion-related word stimuli in their first or second language, it becomes apparent that, much like monolingual speakers, results are not always consistent. Certain explanations involving levels of conflict processing become more prevalent in discussion of such experiments. Exemplifying this, Fan et al. (2016) examined that emotionality between first and second language may influence levels of conflict control, and attention towards distinct word forms. This allocation of attention impacts the speed of responses and accuracy of recall, showcasing potential applications in real-life scenarios. Similarly, findings from Wu and Zhang (2019) found bilingual individuals were more sensitive to positive emotion-label or emotion-laden words, motivating earlier facilitation in rates of conflict resolution. In addition, the impact of positively or negatively-valenced emotion stimuli can present opposing findings among bilinguals. Ferré et al. (2010) found similar results in recall and processing across valences, but with stronger responses in the second language. However, Brase and Mani (2017) noted heightened accuracy in responses in the second language for negatively-valenced words, particularly after auditory simulation. These contradicting findings highlight the need for more research to establish consistent information regarding the processing of emotion-label word stimuli in bilingual speakers, crucial for confirming or denying assumptions related to the dominant language.

Discussion, Applications, and Future Directions

The current availability of academic research and contemporary literature exploring mental processes at play in acquiring a foreign language or deepening understanding of L1 and L2 relies on studies focused on one of these disciplines. However, it is necessary to advance future research by implementing an increasing number of studies that encompasses a sample of participants from both linguistic groups rather than their own separate entities. By expanding the current body of experimental studies involving language processing, researchers and learners can draw more precise comparisons among distinct language abilities.

Psycholinguistics is a dynamic field that can touch into multiple aspects of everyday life. Understanding the practical

application of real-life scenarios regarding how language is acquired and processed reveals a highly relevant implication. This review highlights how the expression of medical or mental health needs often varies in emotionality when facilitated by monolingual or bilingual speakers. Context and background play crucial roles in the level of emotional intensity experienced by second language learners or speakers. Proper communication methods are essential in order for patients to effectively and accurately convey their vital needs. By addressing these aspects, expanding psycholinguistic research can further improve the quality of support and care given to diverse linguistic groups.

The idea of language switching can be employed in these scenarios, in which bilingual speakers switch between their first and second languages. Additionally, self-perception influences methods of communication, particularly through mental health care. Some bilingual patients may prefer to initiate therapy sessions in their second language, as it feels safer and more distant compared to reflecting on traumatic experiences in a first language, which is often more anxiety-inducing (Pavlenko, 2008). Other instances can occur where doctor-patient interactions are altered based on the perceived understanding of the spoken language. Patients might feel inclined to express their needs in a second language due to anxiety about not being fully understood by their healthcare provider in their native language. Research from Angermeyer (2010) highlighted the fears of improper translation in bilinguals, and thus the implementation of codeswitching – a phenomena where individuals switch to speaking a different language, oftentimes mid-sentence. Non-verbal cues such as facial expressions, body language, or subtle gestures also appear to hold heightened emotionality in these instances, potentially stemming from fear or nervousness (Poel et al., 2010).

Research conducted by Meuter et al. (2015) analyzed doctor-patient communication within terms of language barriers using review of recorded hospital interactions. Patients whose preferred language did not align with their practitioners reported more psychological stress and less perceived effectiveness of communication in a post-appointment interview. Negative consequences can arise by means of medically significant communication errors, misunderstanding of needs, and overall strong language discrepancies, which could lead to harmful health risks.

The affectivity of communication in relation to emotionally-charged subjects in medical or mental health care present distinctive challenges when thinking about versus feeling them (Ferré et al., 2022). It is crucial to highlight these results to enhance the effectiveness of communication related to vital necessities, potentially through policy, increased training, or availability of interpreters to overcome language barriers and increase patient comfort when conveying emotional information to therapists or healthcare providers.

Furthermore, a largely considered element surrounding the discussion of legal testimony involving foreign or second language speakers is the role of interpreters. These professionals are not only responsible for translating testimony to and from defendants, but also must ensure that it is delivered in the same tone of the speaker at trial (Hale, 2002). The efficiency of portrayal can significantly influence the outcome of one's trial and how jurors perceive those on the stand. If such interpreters are not fully trained to translate quickly and accurately while properly conveying speech styles, there may be detrimental implications for the trial outcome.

Liu and Hale (2018) implemented a training program focusing on proper methods for legal proceedings. An experimental group, who received this training, reported greater accuracy in interpretation, verbatim repetition, and practical application of this knowledge in live situations. Additionally, this group reported more satisfaction and confidence in their abilities post-training compared to their prior states before any formal program. This study was inspired by Hale (2002), who revealed that informal training led to more hesitations and inaccurate filler words, resulting in improper representation of the defendant's original message. These findings carry a great impact on the outcomes of trials involving bilingual speakers or second language learners when their words are being interpreted properly and accurately.

Thus, it is likely that those on a witness stand resort to codeswitching, as mentioned previously in regards to medical care, due to perceived accent bias. These can have direct implications in which jurors may favor certain defendant's testimony, merely based on the accent they are speaking in, likely leading to an unfair trial. A study by Pantos and Perkins (2013) implemented an implicit association test (IAT) to test participant's perception of foreign accents. Their results revealed that implicit attitudes are linked to emotional responses, even when not explicitly stated, indicating a bias towards individuals speaking in a shared native language.

Increasing interpreter training and potentially implementing some form of additional juror screening into policy, such as a pre-trial implicit association test, could be pivotal steps in reducing influenced courts or jurors. It is vital to impose some form of intervention to ensure fairness in trials, and that no bias, fear of perception, or inaccuracy of testimony is present in a court hearing that could prompt a detrimental outcome. Additionally, it is crucial for researchers to give more consideration to the age at which individuals begin to acquire a second language. For monolingual speakers, the acknowledgment of age onset should be compared alongside testing results to a corresponding age of bilingual speakers' second language learning. Current sample pools, although not explicitly outlined in this review of previous studies, are often limited, typically resembling the sizes of an average primary education classroom. Although multiple studies have replicated and expanded on prior research, larger samples are imperative to ensure greater accuracy in the generalization of results.

This field of research continues to expand, and more coverage of the mental representations utilized by individuals are necessary for establishing clearer conclusions, especially with respect to real-life implications. Exploring tools that can

enhance training methods for previously mentioned healthcare providers, legal professionals, or educators to better serve patients, clients, or students can significantly improve communication across diverse linguistic backgrounds.

In essence, this literature review aimed to emphasize the distinctions and lack of consistent results of psycholinguistic study when comparing processing abilities in monolingual and bilingual speakers across languages. The discussion of applications in everyday scenarios, such as through medical and legal aid, can serve as a stepping stone to guide future research that seeks to employ efficient methods in the long-term. Therefore, to understand the complexities regarding emotional recognition and expression in varying linguistic environments it is fundamental to increase our awareness of the distinct complexities behind cognitive processing of emotion-label and emotion-laden words, with respect to their arousal and valence within and across languages.

References

Altarriba, J., & Basnight-Brown, D. M. (2012). The acquisition of concrete, abstract, and emotion words in a second language. International Journal of Bilingualism, 16(4), 446-452. https://doi.org/10.1177/1367006911429511

Angermeyer, P. S. (2010). Interpreter-mediated interaction as bilingual speech: Bridging macro-and micro-sociolinguistics in codeswitching research. International Journal of Bilingualism, 14(4), 466-489. https://doi.org/10.1177/1367006910370914

Arriagada-Mödinger, F., & Ferreira, R. A. (2022). The effect of emotional valence on auditory word recognition memory in English as a foreign language. Journal of Psycholinguistic Research, 51(2), 309-322. https://doi.org/10.1007/s10936-022-09841-3

Ayçiçegi-Dinn, A., & Caldwell-Harris, C. L. (2009). Emotion-memory effects in bilingual speakers: A levels-of-processing approach. Bilingualism: Language and Cognition, 12(3), 291-303. https://doi.org/10.1017/s1366728909990125

Brase, J., & Mani, N. (2017). Effects of learning context on the acquisition and processing of emotional words in bilinguals. Emotion, 17(4), 628-639. https://doi.org/10.1037/emo0000263

Caldwell-Harris, C. L., & Ayçiçeği-Dinn, A. (2009). Emotion and lying in a non-native language. International Journal of Psychophysiology, 71(3), 193-204. https://doi.org/10.1016/j.ijpsycho.2008.09.006

Conrad, M., Recio, G., & Jacobs, A. M. (2011). The time course of emotion effects in first and second language processing: A cross cultural ERP study with German–Spanish bilinguals. Frontiers in Psychology, 2, Article 351. https://doi.org/10.3389/fpsyg.2011.00351

Dewaele, J. M. (2016). Thirty shades of offensiveness: L1 and LX English users' understanding, perception and self-reported use of negative emotion-laden words. Journal of Pragmatics, 94, 112-127. https://doi.org/10.1016/j.pragma.2016.01.009

Driver, M. (2022). Emotion-laden texts and words: The influence of emotion on vocabulary learning for heritage and foreign language learners. Studies in Second Language Acquisition, 44(4), 1071-1094. https://doi.org/10.1017/s0272263121000851

Dudschig, C., De la Vega, I., & Kaup, B. (2014). Embodiment and second-language: Automatic activation of motor responses during processing spatially associated L2 words and emotion L2 words in a vertical Stroop paradigm. Brain and language, 132, 14-21. https://doi.org/10.1016/j.bandl.2014.02.002

Fan, L., Xu, Q., Wang, X., Zhang, F., Yang, Y., & Liu, X. (2016). Neural correlates of task-irrelevant first and second language emotion words–evidence from the emotional face–word Stroop task. Frontiers in Psychology, 7, Article 1672. https://doi.org/10.3389/fpsyg.2016.01672

Fan, L., Xu, Q., Wang, X., Xu, F., Yang, Y., & Lu, Z. (2018). The automatic activation of emotion words measured using the emotional face-word Stroop task in late Chinese–English bilinguals. Cognition and Emotion, 32(2), 315-324. https://doi.org/10.1080/02699931.2017.1303451

Ferré, P., García, T., Fraga, I., Sánchez-Casas, R., & Molero, M. (2010). Memory for emotional words in bilinguals: Do words have the same emotional intensity in the first and in the second language?. Cognition and Emotion, 24(5), 760-785. https://doi.org/10.1080/02699930902985779

Ferré, P., Sanchez-Casas, R., & Fraga, I. (2013). Memory for emotional words in the first and the second language: Effects of the encoding task. Bilingualism: Language and Cognition, 16(3), 495-507. https://doi.org/10.1017/s1366728912000314

Ferré, P., Guasch, M., Stadthagen-Gonzalez, H., & Comesaña, M. (2022). Love me in L1, but hate me in L2: How native speakers and bilinguals rate the affectivity of words when feeling or thinking about them. Bilingualism: Language and Cognition, 25(5), 786-800. https://doi.org/10.1017/s1366728922000189

Hale, S. (2002). How faithfully do court interpreters render the style of non-English speaking witnesses' testimonies? A data-based study of Spanish—English bilingual proceedings. Discourse Studies, 4(1), 25-47. https://doi.org/10.1177/1461445602004001020 1

Hsu, C. T., Jacobs, A. M., & Conrad, M. (2015). Can Harry Potter still put a spell on us in a second language? An fMRI study on reading emotion-laden literature in late bilinguals. Cortex, 63, 282-295. https://doi.org/10.1016/j.cortex.2014.09.002

Iacozza, S., Costa, A., & Duñabeitia, J. A. (2017). What do your eyes reveal about your foreign language? Reading emotional sentences in a native and foreign language. PloS one, 12(10), e0186027. https://doi.org/10.1371/journal.pone.0186027

Jiménez Catalán, R. M., & Dewaele, J. M. (2017). Lexical availability of young Spanish EFL learners: Emotion words versus non-emotion words. Language, Culture and Curriculum, 30(3), 283-299. https://doi.org/10.1080/07908318.2017.1327540

Kanazawa, Y. (2021). Do not (just) think, but (also) feel!: Empirical corroboration of Emotion-Involved Processing Hypothesis on foreign language lexical retention. SAGE Open, 11(3), 21582440211032153. https://doi.org/10.1177/21582440211032153

Kazanas, S. A., & Altarriba, J. (2015). The automatic activation of emotion and emotion-laden words: Evidence from a masked and unmasked priming paradigm. The American Journal of Psychology, 128(3), 323-336. https://doi.org/10.5406/amerjpsyc.128.3.0323

Kazanas, S. A., & Altarriba, J. (2016). Emotion word processing: Effects of word type and valence in Spanish–English bilinguals. Journal of Psycholinguistic Research, 45, 395-406. https://doi.org/10.1007/s10936-015-9357-3

Kuchinke, L., Jacobs, A. M., Võ, M. L. H., Conrad, M., Grubich, C., & Herrmann, M. (2006). Modulation of prefrontal cortex activation by emotional words in recognition memory. Neuroreport, 17(10), 1037-1041. https://doi.org/10.1097/01.wnr.0000221838.27879.fe

Liu, J., Fan, L., Tian, L., Li, C., & Feng, W. (2022). The neural mechanisms of explicit and implicit processing of Chinese emotion-label and emotion-laden words: evidence from emotional categorisation and emotional Stroop tasks. Language, Cognition and Neuroscience, 37(1), 1-18. https://doi.org/10.1080/23273798.2022.2093389

Liu, X., & Hale, S. (2018). Achieving accuracy in a bilingual courtroom: The effectiveness of specialised legal interpreter training. The Interpreter and Translator Trainer, 12(3), 299-321. https://doi.org/10.1080/1750399X.2018.1501649

Macedonia, M., & Klimesch, W. (2014). Long-term effects of gestures on memory for foreign language words trained in the classroom. Mind, Brain, and Education, 8(2), 74-88. https://doi.org/10.1111/mbe.12047

McWilliam, L., Schepman, A., & Rodway, P. (2009). The linguistic status of text message abbreviations: An exploration using a Stroop task. Computers in Human Behavior, 25(4), 970-974. https://doi.org/10.1016/j.chb.2009.04.002

Meuter, R. F., Gallois, C., Segalowitz, N. S., Ryder, A. G., & Hocking, J. (2015). Overcoming language barriers in healthcare: A protocol for investigating safe and effective communication when patients or clinicians use a second language. BMC Health Services Research, 15(1), 1-5. https://doi.org/10.1186/s12913-015-1024-8

Milanović, I. (2019). English as a foreign language: how emotional can it be? (Doctoral dissertation, University of Zagreb. University of Zagreb, Faculty of Humanities and Social Sciences. Department of English language and literature). https://urn.nsk.hr/urn:nbn:hr:131:370532

Nook, E., & Champoux-Larsson, M. F. (2022). How first-and second-language emotion words influence emotion perception in Swedish-English bilinguals. Bilingualism: Language and Cognition, 1-11. https://doi.org/10.1017/s1366728923000998

Pantos, A. J., & Perkins, A. W. (2013). Measuring implicit and explicit attitudes toward foreign accented speech. Journal of Language and Social Psychology, 32(1), 3-20. https://doi.org/10.1177/0261927X12463005

Pavlenko, A. (2008). Emotion and emotion-laden words in the bilingual lexicon. Bilingualism: Language and Cognition, 11(2), 147-164. https://doi.org/10.1017/s1366728908003283

Pavlenko, A. (2008). Structural and conceptual equivalence in the acquisition and use of emotion words in a second language. The Mental Lexicon, 3(1), 92-121. https://doi.org/10.1075/ml.3.1.07pav

Poel, K. V. D., & Brunfaut, T. (2010). Medical communication in L1 and L2 contexts: Comparative modification analysis. Intercultural Pragmatics, 7(1), 103-129. https://doi.org/10.1515/iprg.2010.005

Sianipar, A., Middelburg, R., & Dijkstra, T. (2015). When feelings arise with meanings: How emotion and meaning of a native language affect second language processing in adult learners. PLoS One, 10(12), e0144576. https://doi.org/10.1371/journal.pone.0144576

Vives, M. L., Costumero, V., Ávila, C., & Costa, A. (2021). Foreign language processing undermines affect labeling. Affective Science, 2, 199-206. https://doi.org/10.1007/s42761-021-00039-9

Warriner, A. B., Kuperman, V., & Brysbaert, M. (2013). Norms of valence, arousal, and dominance for 13,915 English lemmas. Behavior Research Methods, 45, 1191-1207. https://doi.org/10.3758/s13428-012-0314-x

Wu, C., & Zhang, J. (2019). Conflict processing is modulated by positive emotion word type in second language: An ERP study. Journal of Psycholinguistic Research, 48, 1203-1216. https://doi.org/10.1007/s10936-019-09653-

Zhang, J., Wu, C., Meng, Y., & Yuan, Z. (2017). Different neural correlates of emotion-label words and emotion-laden words: An ERP study. Frontiers in Human Neuroscience, 11, Article 455. https://doi.org/10.3389/fnhum.2017.00455

Zhang, J., Wu, C., Yuan, Z., & Meng, Y. (2020). Different early and late processing of emotion-label words and emotion-laden words in a second language: An ERP study. Second Language Research, 36(3), 399–412. https://doi.org/10.1177/0267658318804850

Sophie Manu, University of Toronto, Double Major in Psychology and Cognitive Science, Minor in Buddhism, Psychology and Mental Health

Sophie Manu graduated from the University of Toronto in 2023 with a bachelor's degree in Psychology and Cognitive Science. She became fascinated with consciousness research in her second year at U of T, and since then has explored near-death experiences in several coursework papers. Her research interests focus on how we can ameliorate and treat pathologies, and how we can flourish and live meaningful lives. She is currently working in a neurodevelopmental lab at SickKids, focusing on autism research in young children. She hopes to go on to graduate studies in clinical psychology or teaching, as she is passionate about supporting children in their development. She enjoys yoga, baking cookies, traveling and reading in her spare time.

Was there a particular experience that sparked your research interests?

From a young age, I was interested in altered states of consciousness without realizing it. I remember in Grade 6 silent reading, I brought my brother's book an astral travel to class. Then, I tried to lucid dream and kept a dream journal for a period of time. Since then, my interest in similar experiences has grown as I have been exposed to more research during university. When the pandemic started, I took a summer course and I wrote my first paper on NDEs. I loved exploring the mystery of this phenomenon, it felt like being a detective. Since then, my interest has only been cemented as more research is conducted on NDEs and their potential benefits and as I found out my father experienced an NDE in 2021.

Who has been the most influential person in your life?

My mom, dad and brother have all influenced me and encouraged me to pursue my interests, even if they are off the beaten path. My parents are both extremely creative and talented, and my brother's interests have definitely inspired my own. A lot of what I know about Buddhism, lucid dreaming, altered states of consciousness are inspired by my brother's interests. I think it's common for younger siblings to adopt their older siblings' interests, and I am fortunate to have a brother who is passionate about super cool things! He has taught me so much about meditation, encouraging me to explore my own Buddhist path and is always so supportive of everything I do.

What is your greatest accomplishment?

This might sound cheesy, but I would say having my work published is one of my greatest accomplishments. It's extremely flattering to know that people are interested in my ideas and what I have to say. I have never considered myself to be a writer, so it is really cool to be chosen to be in this journal, and I'm grateful for this opportunity.

Where do you see yourself in 10 years?

These types of questions used to really bother me and cause a lot of anxiety, but I think this past year I have gained more clarity in my answers. Working with children this past year full time, I see myself counseling children and teens, and I'm especially interested in treating people with OCD or working to increase well-being in hospitalized children. I also hope to have my yoga teacher training and cross off a few countries on my bucket list!

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Increasing Death Competency to Reduce Pathology: A Predictive Processing Account of the Benefits of Approaching Death-Stimuli

Sophie Manu and Mark Miller

University of Toronto

This paper explores the benefits of approaching death-related stimuli. Research suggests that death anxiety is a transdiagnostic factor underlying mental disorders like obsessive compulsive disorder, anxiety disorders, and major depressive disorder. This paper focuses on expanding the current practices used to treat death anxiety and investigates how exposing ourselves to the topic of death in mundane and radical ways may reduce overwhelming death anxiety. Specifically, this paper offers a potential explanation for why near-death experiences (NDEs) induced via meditation, psychedelics, or virtual reality may dramatically decrease death anxiety by using the Predictive Processing Framework as an explanatory model. This review of death anxiety and PPF literature suggests a potential relationship between NDEs and the reduction of pathological symptoms worthy of further research.

Keywords: death anxiety, death competency, mental disorders, near-death experiences (NDEs), predictive processing framework (PPF)

"Study death always, so that you'll fear it never."- Seneca

1. Introduction

There is a natural tendency for all humans to fear death and to work toward self-preservation (Botîlcã, 2015). A healthy fear of death can protect us from dangerous situations, like crossing the street at the wrong time and gathering in large groups during a pandemic. It can encourage people to live a healthy lifestyle, monitor their diet and exercise, and pursue meaningful personal endeavors (Vail et al., 2012). However, if the fear of death overwhelms the individual, death anxiety can over-occupy one's cognitive resources, leading to maladaptive coping strategies (Menzies et al., 2019).

Death anxiety can be defined broadly, at least in part, as a fear of death and a negative psychological response to the real or imaginary death of oneself or others (Blomstrom et al., 2020; Zheng et al., 2020). It can include fears of the dying process, watching loved ones die, premature death, punishment after death, and how they will cope with death or how others will react to their absence (Menzies & Menzies, 2023). It may manifest as distress when discussing death, cognitive deficits such as low concentration, and negative emotions (AlZaben & Al Adwan, 2022). High levels of death anxiety are prevalent among elderly populations as they experience more chronic disease, cognitive decline, and the loss of friends and family (Khademi et al., 2020). In addition, there is empirical and theoretical evidence that death anxiety is an underlying factor in several mental disorders and may play a causal role in symptom severity (Menzies & Menzies, 2020; Menzies & Nimrod, 2019). For example, death anxiety is hypothesized to be a transdiagnostic criterion involved in the maintenance of conditions like major depressive disorder (MDD), generalized anxiety disorder (GAD), and obsessive-compulsive disorder (OCD), among other conditions (Iverach et al., 2014). In turn, death anxiety has the potential to underpin a range of disorders and in treatment, it may be effective to target the fear of death directly.

Today, a growing literature explores the impact of death competency to alleviate the negative impacts of death anxiety. Death competency can be described as the range of skills, attitudes, and beliefs that help an individual deal with death, including their own mortality and the death of others (Miller-Lewis et al., 2019). This includes having open discussions on death, thinking of funeral arrangements, and acknowledging one's personal history of loss. Death competency has professional implications. For example, grief counselors must cultivate death competency to provide high-quality care to patients – they must be able to listen to graphic descriptions of death while monitoring their internal sensations and responding appropriately. A lack of death competency may result in the counselor experiencing high anxiety levels when listening to a client, which can take away from the effectiveness of counseling (Gamino & Ritter, 2012). Nurses, doctors, and other medical professionals must learn to effectively cope with death to prevent compassion fatigue and burnout (Zheng et al., 2020). Finding ways to increase death competency can positively

affect medical professionals and their ability to cope with patient death. However, it is imperative that all individuals, regardless of profession, have a healthy attitude toward death.

This paper will survey the multiple avenues to increase death competency and decrease death anxiety, including mundane exposure to death-related stimuli and more radical methods such as traditional contemplative practices, psychedelics, and virtual reality-induced near-death experiences (NDEs). By actively exposing ourselves to death-related stimuli or death-like experiences, rather than avoiding the topic of death, it is proposed this can decrease symptoms of several psychopathologies and increase well-being in healthy individuals. Section One will discuss the problem of death, including recent psychological research on death anxiety, its relation to mental disorders and current treatment options. Section Two will look at old and new ways of radically increasing death competency. Section Three will explore a new cognitive science framework called predictive processing (PPF) that may offer a possible unified framework of both the negative impacts of death anxiety and the benefits of undergoing death-like experiences. Finally, Section Four will discuss the limitations of exploring death, including which populations should not partake in the suggested practices. Overall, this paper aims to show that we perpetuate pathology and live a constrained life by avoiding and fearing death. We can break free from this lifestyle by combining ancient and innovative practices to safely encounter death and live a meaningful and rich life.

2. The "Problem" of Death

This section will investigate recent theoretical and empirical evidence supporting the link between death anxiety and mental disorders. It will provide an overview of death anxiety treatment options, with the primary focus on exposure interventions and their clinical effectiveness to reduce OCD and PTSD symptomatology.

2.1 Death Anxiety as a Transdiagnostic Construct

There is a movement in clinical psychology to find constructs that underlie or contribute to the maintenance of multiple mental disorders (Iverach et al., 2014). Often, an individual diagnosed with one mental disorder will at some point be diagnosed with another distinct disorder (e.g., around 50% of individuals with an anxiety disorder are also diagnosed with major depressive disorder) (Zbozinek et al., 2012). Identifying constructs that underlie multiple mental disorders can be targeted directly in treatment to alleviate symptoms and prevent the emergence of new mental health problems (Menzies et al., 2021). Several transdiagnostic constructs have been proposed thus far in the literature, including intolerance to uncertainty, perfectionism, emotional regulation, anhedonia, and death anxiety (Gillett et al., 2018; Sloan et al., 2017). It is theorized that death anxiety may contribute to the maintenance and development of several pathologies, including generalized anxiety disorder (GAD), specific phobias, and OCD (Menzies & Menzies, 2023). Frequently in these pathological conditions, certain situations or objects such as germs, planes and heights are feared as they carry the potential to cause death, whether or not the fear of death is explicitly stated by the individual. Iverach et al. (2014) surveyed how the fear of death is an underlying theme in many anxiety disorders and can drive specific pathological behaviors. For example, the phobia of flying on a plane may ultimately be related to the fear that the plane could crash and the individual will die. Other phobias may not relate to death explicitly yet they still may be exacerbated when mortality salient stimuli (stimuli that reminds the individual of death) is presented. Strachan et al. (2007) found an increase in fear response and avoidant behaviors in those with a spider phobia after viewing mortality salient stimuli in comparison to non-spider phobics presented with the same stimuli. This suggests a potential relationship between mortality and the maintenance or exacerbation of phobias.

In OCD, obsessions regarding contamination and the compulsion to excessively wash one's hands can be explicitly related to the fear that one will catch or spread a deadly illness (Menzies et al., 2020). Other OCD subtypes including harm obsessions (e.g. fears of hurting loved ones) and hyper-responsibility obsessions (e.g. fears of being responsible for a car accident), relate to the fear of hurting, injuring or killing other people (Menzies et al., 2020). While some OCD subtypes such as sensorimotor or obsessions with symmetry do not seem related to death, it can be the case that someone spends time rearranging something a certain way due to the belief that if they do not, something bad could happen to a loved one. In turn, many OCD subtypes at their core can relate to the fear of death (Menzies and Dar-Nimrod 2017; Menzies et al., 2015). In somatic disorders, an individual may excessively check their body for signs of illness, such as a heart attack or stroke, to avoid the possibility of dying. Other conditions like eating disorders, major depressive disorder (MDD), and posttraumatic stress disorder (PTSD) have also been linked with fears of death (Menzies & Menzies, 2023).

Studies have also examined the positive relationship between death anxiety and symptom severity. One study found moderate to large correlations between the Collett-Lester Fear of Death Scale scores and the clinical ratings of OCD severity, distress, and impairment as they found that presenting mortality salient stimuli to 171 participants diagnosed with OCD increased compulsive hand-washing behaviors compared to a control condition who was presented with neutral stimuli (Menzies & Dar-Nimrod, 2017). Notably, both groups reported no change in anxiety, despite the experimental group spending nearly double the time washing their hands. This experimental study is significant as it controlled for trait neuroticism, in turn supporting the role that death anxiety may be driving clinically relevant behavior. Strachan et al. (2007) investigated how reminders of death intensified anxiety and avoidance among those with social anxiety disorder. They found that those with social anxiety disorder were more avoidant of social interaction after being reminded of their death. This

suggests that even in disorders that do not seem connected to death, there may be a relationship between fears of death and symptom severity (Strachan et al., 2007). Recently, Menzies et al. (2019) found that death anxiety strongly predicted symptom severity in 200 participants with various mental disorders, including MDD, GAD, OCD, PTSD, and anorexia nervosa as they found a significant correlation between death anxiety and psychopathology in twelve disorders not accounted for by neuroticism. In a subsequent paper, Menzies et al. (2021) conducted an experimental study with 128 individuals with body scanning disorders (i.e., panic disorders, illness anxiety disorder) and those with non-scanning disorders (i.e., depression). They found that body scanning behaviors and the intention to visit a medical professional increased after being primed with mortality salient questions (e.g. "Please briefly describe the emotions that the thought of your own death arouses in you"), but only for the participants diagnosed with body scanning disorders. These studies suggest that death anxiety is positively related to symptom severity and that targeting fears of death may be an appropriate avenue for treating numerous pathological conditions (Menzies et al., 2019).

2.2 Death Anxiety Treatments: Exposure Interventions

If death anxiety underpins a range of mental health conditions, then there is a value in implementing treatments to target fears of death in addition to standard care (Heidenreich et al., 2021).There are multiple treatment avenues for death anxiety but selecting a treatment is highly variable and may depend on the individual's history with death, existing mental health conditions and the severity of impairment (Menzies et al., 2018). Death anxiety treatment research has primarily focused on non-clinical samples such as healthcare professionals, who are exposed to death on a regular basis and may experience subsequent distress (Iverach et al., 2014). Other groups of interest include individuals with terminal illnesses like cancer, or those who have survived cancer, as these populations have been found to experience higher than average rates of death anxiety (Lo et al., 2013). Cognitive-existential psychotherapy is a well-supported intervention which can involve working with a clinician to find meaning in one's life, discussing and reframing one's thoughts around death, and has a history of being implemented in terminally ill patients and those with non-terminal cancer (Breitbart et al., 2004; Kissane et al., 2003; Lekay & Wilson, 2008).

Other clinical interventions specifically aim to address death anxiety by engaging with death-related topics and gradually increasing people's interaction with death-related stimuli (Bartalos & Caffrey, 2009). Exposure based therapies are a subtype of cognitive behavioral therapies (CBT) used to treat specific phobias, anxiety disorders, OCD and PTSD (Carl et al., 2019). During exposure therapy, an individual is gradually and repeatedly exposed to fearful or avoided stimuli in a safe setting. By confronting negative emotions, anxiety and fear are expected to decrease as the individual habituates to the stimuli. Exposures are tailored to the specific fears or phobias of the individual and can involve imaginal (using one's imagination to imagine a feared scenario), in-vivo (real life), and interoceptive (bringing about feared bodily sensations) exposures. The administration is adapted based on the disorder being treated. For example, trauma-focused exposure therapies like prolonged exposure are first-line treatments for treating those with PTSD. Prolonged exposure therapy can involve retelling the traumatic memory or confronting trauma reminders to overcome avoidance. By confronting the traumatic memory, new learning can take place and the anxiety regarding the memory may decrease or extinguish. Typically, an exposure hierarchy is created, beginning with low-anxiety-inducing situations that the patient has been avoiding, and working up to more challenging situations (Foa & McLean, 2016). In a randomized controlled trial with 119 participants with PTSD, exposure therapy as compared to psychotherapy focusing on coping skills, had a more significant effect on symptom reduction. However, they noted higher rates of attrition in the exposure therapy condition. This may be due to the fact that exposure therapy can cause significant distress as the individual is required to relive parts of the traumatic memory. In turn, while exposure therapy in PTSD treatment may be more effective, it may not be suitable or tolerable for every patient and other therapeutic interventions may need to be used first which emphasize the safety and coping skills of the patient (Carl et al., 2016; Norman et al., 2019).

In OCD, the subtype of exposure therapy known as exposure and response prevention therapy (ERP) is considered the gold standard treatment (Bandelow et al., 2015). This intervention involves exposure to a feared or avoided stimuli/obsession without the performance of a compulsion/ritual (performed by OCD sufferers to reduce anxiety). For example, a patient with harm obsessions may be asked to hold a knife for a duration of time if they have been avoiding using them for fear of hurting a loved one. An imaginal exposure for harm obsessions may involve having a patient write a script of their worst case scenario of harming a loved one and the outcome of that situation. The goal is to develop new information about the feared stimuli and to learn to tolerate distress without performing compulsions (Racz et al., 2024). In PTSD, OCD, and other anxiety-related disorders, the reduction of avoidant behaviors is a common treatment target (Johansen and Krebs, 2009).

The rationale of exposure therapy with regard to the fear of death is that in order to reduce death anxiety, individuals must confront death-related stimuli to overcome fears of death, as avoidance perpetuates the belief that death is fearful, unpleasant, and worrisome (Bartalos & Caffrey, 2009). Menzies et al (2018) conducted a meta-analysis of death anxiety treatments from 15 randomized controlled trials and found that therapy type was a significant moderator of treatment efficacy. Specifically, they found that CBT interventions, including exposure therapy, produced the greatest reductions in death anxiety. This suggests that treating death anxiety similarly to how other anxiety disorders are treated, through

gradual exposure exercises, may be a useful intervention. Menzies and Veale have surveyed some potential death exposures that can be done in clinical settings. In vivo exposures can include: visiting funeral homes, hospitals, and cemeteries and taking practical steps towards preparing for death such as writing a will and thinking about whether they would prefer to be cremated or buried. More creative exposures may incorporate watching media that includes themes of death or listening to songs that address themes of impermanence. Gaming applications such as A Mortician's Tale, which involve the player proceeding through the steps of cremation, can also be used as exposure exercises (Menzies & Veale, 2022).

Minimal research on death exposures has been conducted, but the few studies show promising results. One study with 134 medical students examined the effect of coffin-lying on death attitudes. The participants were asked to write a will, wear specific clothes, lie in a coffin, and listen to the will read aloud. Pre and post-test measurements of the Death-Attitude Profile found a decrease in scores on questions relating to the fear of death and death avoidance. While acquiring knowledge of the dying process is necessary for medical students, the experiential component of the coffin-lying activity led to a more comprehensive death education (Chiou et al., 2023). With regard to increasing death competency in clinical populations, one study looked at the impact of an online intervention, Overcome Death Anxiety, on individuals diagnosed with anxiety-related mental health conditions. The program included cognitive strategies and exposure practices to treat death anxiety. They found that 60% of the 20 participants had significant changes in their total death anxiety score measured by the Collett-Lester Fear of Death Scale (Menzies et al., 2023). The research on treating death anxiety in clinical populations remains limited but a promising therapeutic avenue to explore. Overall, there is evidence that exposure to death-related stimuli, rather than avoidance, can reduce death anxiety and increase death competency.

It is important to note that certain individuals may not tolerate exposure based therapies, due to other comorbid conditions. Meyer et al. (2014) found that clinicians are most likely to exclude clients from exposure therapies if they present with psychotic symptoms, are highly reluctant to participate or emotionally fragile. Clinicians have also avoided using exposure therapies due to concerns that it may increase patient distress (Rusek et al., 2014). Specifically, concerns about treating PTSD with exposure therapies have been raised, as these vulnerable populations have shown high levels of distress and high rates of dropout during treatment (Meyer et al., 2014). A similar approach should be implemented with regard to death exposures.

3. Radical Death Competency: Monks, Mushrooms, and Techno-NDEs

The following section will highlight a subset of unique death-like experiences and how they have been found to dramatically reduce death anxiety. Given what is known about exposure interventions for anxiety disorders, it is possible that inducing these death-like experiences in certain populations can help reduce pathological behaviors seen in certain disorders. Near-Death-Experiences are especially potent forms of exposure as they seem to offer the most realistic confrontation of one's own mortality due to their combination of cognitive and affective features (Moreton et al., 2019). Specifically, they offer a form of exposure therapy known as flooding, in which an individual is exposed to the most extreme manifestation of their fear rather than working their way up through low to high anxiety inducing situations. Flooding, through the methods that will be described in the following section, has the potential to create notable decreases in death anxiety after a single experience, in turn improving the symptoms of certain disorders.

3.1 The Features of a Near-Death Experience

The most intense and closest psychological replication of death occurs in the phenomenon known as a Near-Death-Experience (NDE) (Tassell-Matamua, 2014). A NDE is a profound subjective and highly individualized experience that occurs unexpectedly in a physiological state close to death, such as a coma, cardiac arrest, or brain injury, with 10-23% of cardiac arrest survivors undergoing an NDE. Several documented cases involve patients who had a cardiac arrest and showed signs of clinical death (defined as no oxygen in the brain, no pulse or breathing, no reflexes, or no behavioral response to stimuli), but were revived with cardio- pulmonary-resuscitation (CPR) (Revonsuo, 2018). NDEs have been reported in non-life threatening situations including during meditation, drug- induced hallucinations, epilepsy, and syncope or fainting, referred to as NDE-like (Charland-Verville et al., 2014). NDEs and NDE-like are similar in phenomenology and score similar on the Greyson NDE scale (a standardized scale used in research to capture the features of the experience). The exact cause of an NDE or NDE-like remains unknown, but the literature and post-NDE reports suggest that the experience is similar across age, culture, and gender (Bianco et al., 2019; Greyson, 2015). Thus, to reflect the universality of this phenomenon, the features of a NDE has been divided into four categories: cognitive, affective, paranormal, and transcendental. Cognitive elements include the distortion of time and life review (seeing notable moments of your life as a series of images). Affective elements include feelings of joy and peace, oneness with the world, and unconditional love. The transcendental aspects of a NDE can include the feeling of entering a heavenly realm and encounters with deceased friends or family. Finally, the paranormal components of a NDE consist of unusually vivid perceptions and an out-of-body experience (OBE), which is a state where one feels dissociated or as if their consciousness is separate from their body. Based on statistical analysis, the combination of various elements from these four categories

constitutes the subjective feel of a NDE (Greyson, 2015).[1]

The majority of NDE or NDE-like are positive and profound for individuals and they provoke long lasting psychological transformation. These effects may include increased quality of life, reduced materialism, increased appreciation for life, reduced fear of death, a sense of purpose, and interconnectedness with others (Greyson, 2015). One of the most salient and commonly reported aftereffects of NDEs is a partial or total loss of the fear of death (Khanna & Greyson, 2015; van Lommel, 2001). This decrease in the fear of death may result from the multitude of features experienced in a NDE. For example, after encountering deceased relatives, death may be viewed as a joyous reunion with loved ones. Furthermore, seeing a white light or having an OBE (some of the paranormal components of a NDE) may strengthen the belief in an afterlife, which may also be responsible for decreasing the fear of death (Greyson & Bush, 1992; Blomstrom et al., 2020). Older studies investigating death attitudes found that NDErs had lower anxiety and concern about death than non-NDErs (using the Death Anxiety Scale) (Sabom, 1983). Recently, Pehlivanova et al. (2022) conducted correlational research examining which features of NDEs had the most impact on death attitudes. They found that life review and encountering mystical beings were strongly associated with a reduced fear of death. In addition, Bianco et al. (2019) measured death anxiety, among other constructs, in 102 participants who underwent a NDE and 104 who did not. They found NDErs had a lower fear of death and were more likely to view death as a transition state rather than a complete annihilation in comparison to the non-NDErs.

Since NDEs are cognitively and affectively intense and involve direct confrontation or feelings that one is genuinely dying, this can lead to new insights on how to live a meaningful life and a drastic change in one's goals. For example, career changes and divorces are reported to occur post-NDE (Greyson, 2015). It is worth noting that minimal research explores the potential negative aftereffects of NDEs. It is estimated that approximately 10 percent of NDEs are frightening and highly aversive. For example, individuals have reported seeing hellish imagery and feeling intense fear and distress, rather than the usual affective experience of joy, peace and wonder (Cassol et al., 2019). In addition, Jock (2024) has argued that some features of NDEs, like dissociation, are shared with PTSD. While many NDEs may be life-altering, there is currently no therapeutic guide for how to help individuals integrate these experiences in their lives. It is important to note that both euphoric and dysphoric NDEs are frequently categorized in the literature as spiritually transformative experiences (STEs). These experiences, which alter one's sense of self and priorities, may be challenging to integrate into one's life (Cassol et al., 2019). While STEs are typically non-pathological, they may provoke feelings of confusion regarding one's personal or social identity. STEs can also be socially isolating and difficult to talk about with loved ones, who may not understand the nature or profoundness of the experience. Therefore, it is imperative to offer support and counseling to those who may experience diminished functioning after an NDE (Brook, 2021).

Based on the literature, it is reasonable to believe that NDEs have the potential to increase death competency as they have been shown to change people's attitudes towards death (a key element of death competency) and dramatically reduce or eliminate their previous fears. However, due to the spontaneous nature of NDEs, the research is either retrospective (asking participants about a prior NDE) or prospective (asking participants how their lives have changed following a NDE). The following three methods of inducing a NDE-like offer an opportunity to investigate the experience in real-time and can provide new insights into this transformative phenomenon (Van Gordon et al., 2018).

3.2 Comtemplative Practices

One of the oldest methods of inducing a NDE-like has been reported in ancient Buddhist texts. Using meditation to investigate death is a longstanding practice in Buddhism. Some texts describe how practitioners can gain insight into the dying process. For example, the Tibetan Buddhist practice of Maranasati (mindfulness of death) involves meditating while keeping death at the forefront of one's thoughts. The practitioner may imagine their corpse and its decay as a way of awakening and appreciating the present moment by being reminded of their mortality (Cassidy, 2020). Another practice in Tibetan Buddhism, known as Chod, involves meditating in cemeteries or frightening places, to induce fear in the practitioner. These techniques all foster the familiarization with death and the acceptance of impermanence. In Tibetan culture, experiences that resemble NDEs, known as delogs, can be induced by experienced practitioners (Van Gordon et al., 2018). Delogs can last for hours or days and include phenomenology akin to a NDE, such as ego-dissolution, visiting otherworldly realms, and new perspectives of death (Bailey, 2001).

Few studies have empirically investigated meditation NDE-like, as it is difficult to find individuals with the training and abilities to self-induce this state. Van Gordon et al. (2018) conducted a three year longitudinal study and examined 12 Buddhist meditators who induced their own NDE and were aware of the content and duration of the experience. Based on the Greyson NDE scale, the researchers found that the content and phenomenology of a meditation-induced NDE-like was like that of a NDE (e.g., encountering spiritual beings, OBE, feelings

1 It is important to note that NDEs are characterized in the literature as specific changes in subjective experience (e.g. white light, out of body experiences, etc…), rather than a particular objective event that happens to an individual. For example, while we might say that a car crash that had a high probability of being fatal, but which narrowly survived, is an experience we might commonly refer to as being "close to death," this may not be accompanied by the requisite subjective experiences to be categorized as an NDE.

of peace). The researchers indicated that it may be valuable to study advanced meditators to understand the neurological changes that take place during a NDE. In non-Buddhist meditators, there is limited research on meditation induced NDEs. However, one study found that twenty minutes of mindfulness meditation reduced death anxiety scores in healthy populations (Jain, 2023).

3.3 Psychedelics

NDE-like can also be induced by administering psychedelics such as lysergic acid diethylamide (LSD), psilocybin, dimethyltryptamine (DMT), mescaline and other 5-HT2A receptor agonists (Moreton et al., 2019). The psychedelic experience, similar to that of a NDE-like, can include visual hallucinations and vivid perceptions, feelings of interconnectedness, and ego dissolution (a disturbance in the sense of self that may partially or entirely blur the lines between the self and the rest of the environment), and themes of death or feelings of dying (Deane, 2020; Moreton et al., 2019; Timmerman et al., 2018). Several studies have used the Greyson NDE scale to investigate the relationship between psychedelic use and their ability to induce a NDE-like (Luke, 2012; Martial et al., 2019; Timmerman et al., 2018). While every psychedelic experience may not be characterized as a NDE-like, there is evidence that some psychedelic experiences are similar in phenomenology to a NDE. For example, DMT has been found to induce a NDE-like, with significant overlap in NDE phenomenology including entering alternative realms, extremely vivid perceptions, communicating with other worldly beings, and ego-dissolution (Timmermann et al., 2018). In addition, Martial et al. (2019) investigated the similarity of 15,000 qualitative reports linked to using 165 psychoactive substances with reports from NDEs. They found that the ketamine reports were most similar in phenomenology to the NDE reports and suggested ketamine may be a useful experimental model for exploring death.

The recent upsurge in psychedelic research has led to the exploration of harnessing the benefits of the psychedelic experience for treating pathologies like MDD, addiction, PTSD, and OCD (Carhart-Harris & Goodwin, 2017). There is evidence that psychedelics can reduce symptom severity of certain disorders, with one of the proposed mediating factors being the reduction in death anxiety that occurs from the experience. Griffiths et al. (2016) administered psilocybin to 51 patients with terminal cancer diagnoses struggling with clinically significant anxiety and depression symptoms. Those in the high-dose group experienced significant decreases in depression and anxiety scores, decreases in death anxiety, and increases in quality of life. These changes were maintained in a 6-month follow-up. Moreton et al. (2022) completed a retrospective survey of 312 participants diagnosed with OCD who had undergone a psychedelic experience. They investigated self-reported changes in death anxiety and obsessive and compulsive behaviors. The results found a correlation between the strength of the mystical experience and the reduction of symptoms. Furthermore, reductions in death anxiety were related to more significant decreases in symptom severity. This study adds to the evidence that death anxiety may underlie OCD and that decreasing death anxiety through exposure may reduce pathological symptoms.

3.4 Virtual Reality

Lastly, an innovative and recent method that may be used to induce NDEs safely is virtual reality technology. The technique is sparse, but worth further exploration as it offers a more controlled experimental environment than psychedelics. In Bourdin's (2017) study, participants underwent OBE's induced through immersive virtual reality (VR). Through VR technology, participants inhabited life-sized virtual bodies that were synchronized with their actual movements and sensations. This setup aimed to create a strong sense of ownership over the virtual body. The study utilized a two-factor between-groups experiment, with 16 female participants per group. In the experimental condition, the viewpoint was shifted out of the virtual body, severing all connections with it, while in the control condition, synchronization persisted. This approach allowed for an investigation into the impact of differing methods of inducing OBEs on participants' fear of death. They found that the experimental group, compared to the control group, had lower scores on the Collett-Lester Fear of Death Scale, indicating a reduced fear of death.

A separate study took VR a step further and aimed to induce a NDE-like by having sixteen participants explore a VR island where they owned a life-sized body that was synchronized to their body movement in real time. The researchers created a strong sense of ownership of the virtual body through "embodiment training," which involved moving the upper part of their virtual body in front of a virtual mirror. Participants rated their feelings of body ownership (the perceptual illusion that the virtual body is their own body) as high throughout the experiment. The researchers believed that a high rating of body ownership could enhance the effectiveness of the NDE-like, as participants would feel as if they were experiencing their own death rather than the death of a character. Throughout six sessions, 16 participants experienced a life cycle including birth, childhood, and then decay. They received embodiment training each session and then were transported to a virtual island where they carried out tasks and interacted with two virtual companions. In the final two sessions, participants watched their companions die and then they witnessed their own death, which included features of a NDE such as an OBE, a white light, and a life review. They found that participants reported life attitude changes, including less focus on material issues compared to the waiting control group. However, there were no significant changes in death anxiety scores. In addition, the researchers found that high ratings of body ownership was maintained throughout all the sessions.This is one of the only studies to attempt to induce a NDE-like with virtual reality and to demonstrate the feasibility of inducing a feeling of a personal death (Barberia et al., 2018). There is

potential to improve the methodology by increasing the realism of the stimuli (e.g. having the virtual body match sex of the participant) and having a larger and more diverse sample size for future experiments. However, virtual reality is becoming increasingly sophisticated and realistic, offering opportunities to safely induce NDE-like elements, like OBEs, without the risks that are associated with psychedelic usage.

4. Radical Methods to Induce Death Comptency and Predictive Brains

This section will demonstrate how the Predictive Processing Framework (PPF) may provide a comprehensive explanation of the benefits of inducing more intense, or more "radical", near-death-like experiences. We will argue that these experiences help to accomplish the following three things: they may help to close the informational gap concerning death, which in turn may help reduce our feelings of uncertainty about this fundamentally uncertain experience; they may provide the individual with valuable information about their own emotional reactions to death and dying, which in turn supports new opportunities for emotional regulation relative to these experiences; and finally, they may produce greater feelings of connectedness and wellbeing through their induction of ego-dissolution.

The PPF is an account of the brain and its functions that has gained popularity in cognitive science (Clark, 2016; Nave 2020; Hohwy 2013). According to the PPF, the brain facilitates adaptive behaviors by creating a model of the world (i.e., a generative model) which uses past learning about the statistical regularities of the environment to generate predictions about the outcome of the organism's actions on the environment and the various causes of incoming sensory input. These predictions are constantly being compared with the incoming sensory information. The difference between the prediction and the incoming signal represents the degree of "prediction error." The goal of the brain, if this framework is correct, is to minimize this prediction error. Error minimization can occur by updating one's generative model to reflect new sensory observations (perceptual inference) or changing one's actions to match their model (active inference). For example, if we had the belief that we were a good student in high school, but we get poor grades in university, we will experience prediction errors. Our sensory observations (our grades) do not match our model that we will do well in school. According to the PPF, we may either update our model that we are a good student with this new information and change our expectations for our next grade, or we may change our actions and work harder in order to improve our grades to match our predicted model. Either of these options helps us minimize the degree of prediction error in the future (Miller et al., 2021).

Recently it has been proposed that the faster or slower the rate of error reduction, that is the more and less efficient the system is at dealing with uncertainty, the more positive and negative affect is felt by the individual (Van de Cruys, 2017; Hesp et al., 2019; Kiverstein et al., 2019). These changes in the rate of error reduction are referred to as error dynamics, and they play a crucial role in helping to minimize uncertainty in the long run—by tuning the predictive system relative to efficiency (Miller et al., 2021). Reducing error in the present moment is one of our goals, although too little error leaves us feeling bored. We are oftentimes curious and playful, as humans. Therefore, we are not trying to have no errors, but rather, to seek out ways of reducing errors better than expected, as this seems to be rewarding to us as predictive agents (Kiverstein et al., 2019). In turn, we may take short-term risks or try novel things—we may take part in experiences that temporarily create feelings of manageable anxiety or uncertainty, if this may increase our overall understanding of the world. Optimal learning rates happen at the edge of your understanding—where you find the most manageable and reducible errors. Finding the right balance between simplicity and complexity enables the agent to optimize their learning and update their models of the environment. It is highly valuable for an agent to be able to locate and manage these optimal slopes of uncertainty as this process helps the predictive agent to stay open and receptive to updating their belief systems relative to new evidence—and so avoid getting stuck in any less-than-optimal belief networks (Miller et al., 2021).

Death reflections and death competencies are an interesting topic to understand given these predictive dynamics. Death is in many ways the ultimate uncertainty. We do not know precisely when it will happen and under what circumstances. We know that pushing thoughts of death away or avoiding the subject may underlie or worsen pathological states (Iverach et al., 2014; Moreton et al., 2022). However, the exposure of actively going through an experience similar to the dying process may be an especially potent anxiety or uncertainty inducing event. Yet, as demonstrated in the previous section and in the literature, individuals who have undergone a NDE or NDE-like report dramatic decreases in the fear of death and a new orientation toward death (Bianco et al., 2019; Pehlivanova et al., 2022; van Lommel, 2011). How then are we to understand these profound death attitude changes given the PPF?

While there is no PPF research examining the construct of death anxiety, we have recently developed new computational perspectives regarding the motivation (and potential mental health benefits) of watching horrifying content (including material reflecting death and dying). During the COVID-19 pandemic, sickness-related horror films soared to the top of the Netflix charts (VanArendonk, 2020), with movies like Contagion topping various download charts. A puzzle emerges: why would predictive agents, whose modus operandi is to reduce uncertainty, watch a dramatization of frightening and uncertain events when there was already so much uncertainty and volatility in their own lives? One possible answer is to use this media to gain good information on how to deal with the real-world uncertainty of the pandemic. Exploring aversive or negative content may be related to the trait of morbid curiosity. This trait inspires individuals to learn and seek information about harmful or life-threatening situations to help them

prepare for that potential outcome. They can close the informational gap by gaining new knowledge on negative situations. Oosterwijk et al. (2019) point out that knowledge about negative stimuli can be valuable in building a realistic model of the world. When we watch a horror movie, it provides an example of possible dangerous situations that may happen to us, like an infectious disease rapidly spreading. We can learn from the mistakes of the characters and apply this to our own life should we ever be in the same scenario. Prediction error-minimizing agents continually attempt to find optimal ways of reducing error. This involves exploring our environment to improve our models and get a better grip on the various meaningful forms of uncertainty we encounter. Predictive agents are then epistemic agents: always looking for ways of improving our state of information by learning new things about the environment. Epistemic actions may not always be comfortable; they may in many cases induce temporary stress or uncertainty within the agent to gain new information on how the world works (Miller et al., 2021). For example, we may find ourselves "rubbernecking" a car accident on the highway not because we enjoy or like it, but because the informational value of negative content is higher than neutral or positive stimuli—we are trying to learn about the causes and conditions of the accident, and the outcomes of these tragedies, so that we can better prepare and avoid these forms of dangerous volatility in the future (Oosterwijk et al., 2019). These informational gains go on to inform the goal-oriented actions we take in the world (Deane et al., 2020).

Horror movies provide a safe way of exploring topics that may be too volatile in the real world (e.g., living through a pandemic). In turn, horror media offers us a rich source of information on frightening events, in the same way that engaging with death-related stimuli provides us with information on death. Watching a documentary about someone with a terminal illness, or taking a death education course, are ways to increase our knowledge of death. By inducing an NDE-like that shares features suspected to be involved in the dying process, like seeing a white light and reuniting with deceased family members, we gain even more information regarding death and we may update our models to support overall error management (Blomstrom et al., 2020; Moreton et al., 2019). Death may no longer feel as foreign or uncertain, as NDErs have learned what sensations or perceptions might occur when they die (Martial et al., 2021). Renz et al. (2017) found that previous near-death or mystical experiences helped facilitate the dying process in cancer patients, likely because of the information gained from their NDE.[2]

A NDEer not only gains information on the death experience, but they learn about their emotional response to death as well. Both mundane and radical methods to increase death competencies allow the agent to learn about their own anxiety or negative error dynamics (i.e. the experience of prediction error unexpectedly increasing). Overtime, given adequate exposure, predictive agents inevitably learn to predict the slopes of uncertainty as they begin to generate a predictive model for challenging internal states. Emotional states, like anxiety, are subject to learning overtime. For example, while the anxiety of public speaking may be intolerable when we first start, over time, while the expected uncertainty of the performances may stay the same, we become better acquainted with these changes in error reduction and so are able to turn the volume (precision) down on them (Van de Cruys, 2017). With regard to NDEs, we increase our tolerance to uncertainty as we learn that errors rise and fall relative to death experiences in a way that we can manage. This can be applied to radical exposures as well. While most NDEs are positive and euphoric, about 10% are frightening, disturbing, and dysphoric (Cassol et al., 2019). These NDEs may involve going to hellish realms, encountering demons, loud or unpleasant noises, or being told the real world never existed. However, the agent learns that the negative emotional experience was temporary and tolerable. The arc of uncertainty or anxiety becomes familiar to individuals who partake in death-related experiences, whether mundane or radical. Thus, the agent becomes better at managing uncertainty as they have generated a model for how uncertainty changes over time (see Sandved-Smith et al. 2021 for a computational account of this process).

2 It is important to note here that according to the PPF individuals may be drawn to frightening stimuli, including themes of death and dying, for various reasons, that can have both positive and negative effects. While engagement with such material can provide valuable insights into personal and environmental dynamics, there exists a cautionary note also regarding potential adverse effects, particularly among individuals harboring strongly negative prior expectations or susceptible to learned helplessness. The documented attraction to horror content among trauma survivors suggests a correlation between real-life peril and the inclination towards frightening media. In PPF terms, high precision expectations about being in danger drive attention and behavior towards confirming evidence—stimuli that match their already held beliefs about being in danger. A concerning pattern can emerge here wherein negative preconceptions fuel a cycle of seeking out horrifying content not for informational or transformational purposes, but rather to validate and perpetuate existing negative beliefs, thereby reinforcing their appeal. For a further discussion of this nuance see Miller, White and Scrivner 2024.

Lastly, NDEs and psychedelic experiences often challenge rigid models of the self through the experience of ego-dissolution and enhanced feelings of connectedness (Deane, 2021; Letheby & Garrans, 2017; Millière, 2017). An ego dissolution can be described as a disturbance in the sense of self that may partially or entirely blur the lines between the self and the rest of the environment. This dissolution often creates feelings of unity with nature, people, and the universe (Deane, 2021). It is theorized that an ego dissolution may help to loosen rigid or pathological models of the self that we may see in MDD, OCD, addiction, and other disorders (Carhart-Harris & Friston, 2019; Deane, 2021). The PPF sees these pathologies emerging from overly certain bad-belief networks that cease to be updated amidst new evidence. For example, in depression, the agent is trapped under a high-level belief that all their actions will lead to worse than expected outcomes, and they remain insensitive to incoming sensory information that relates to outcomes, or predictive success (Villiger, 2022). Carhart-Harris and Friston (2019) propose a predictive processing based-model known as the Relaxed Beliefs Under Psychedelics Hypothesis (REBUS), which suggests that psychedelics work in the brain by creating a state of entropy (uncertainty). By consuming psychedelics, the high-level predictions of a system are attenuated and more receptive to bottom up-input. This makes the person's generative model (instantiated in the brain's architecture) more malleable and open to revising its top-down predictions. The model here has more flexibility due to decreased weight given to dysfunctional top-down predictions (Villiger, 2022). This may be especially valuable for disorders where top-down predictions are rigid and involve maladaptive self-related beliefs, like OCD, depression, and eating disorders (Stoliker et al., 2021). For non-clinical populations, an ego dissolution may help the individual revise life priorities and put more time into meaningful pursuits (Orlowski et al., 2022). In populations with high levels of death anxiety, the uncertainty of who you are as a person that is generated by an ego dissolution may mean there is less resistance when we encounter evidence that we are impermanent. We may be confused as to whether we are a stable self, which makes us open up to the fact that we are susceptible to aging, sickness, injury, and death. In turn, psychedelics may produce the right amount of uncertainty in the brain, which can relax pathological beliefs that were previously resistant to change and may revise our model of the self through the experience of an ego dissolution (Scott & Carhart-Harris, 2019).

Even though there has not been prior work on PPF approaches to death anxiety in particular, we might look to other recent and well established PPF models of anxiety and its alleviation in the literature. For example, Linson and Friston (2020) have developed an account of anxiety and its management using the PPF. In particular, they suggest that for a predictive agent to escape the "vulnerable self-defensive state" that characterizes the high anxiety (i.e. fight or flight) state, the agent must find a way to reduce the precision on the aversive material. By lowering precision on these aspects of the model the agent is freed up to select more beneficial policies. In effect this is tantamount to increasing the cognitive flexibility that characterizes post-traumatic growth and flourishing (Sinapayen et al., 2017; Yehuda & LeDoux, 2007). Our contention here is that NDEs could have exactly this sort of impact on the prior aversion to death-related stimuli. In particular, as we have argued, closing the informational gap, modeling our own aversive responses, and increasing overall entropy in the system (akin to psychedelic use) are all ways in which precision can be effectively reduced from the stimuli and our own predictive models of the aversion.

5. Limitations: Psychological Differences and the Risks of Radical Exposure Interventions

This section will briefly overview which populations should avoid cultivating death competency through radical means of meditation or psychedelic-induced NDE-like. Firstly, there is evidence that individuals with neurotic personality traits, who are tuned towards negative stimuli, should avoid meditation as it may increase the risk of the psychiatric condition known as depersonalization disorder (DPD) (Deane et al., 2020). Individuals with PTSD may also experience adverse effects during meditation (Farias et al., 2020). In addition, individuals with high trait neuroticism may be more likely to have a negative experience when administered psychedelics (Barrett et al., 2017). Other populations who should avoid psychedelics include individuals with schizophrenia or a history of psychosis, as these substances may exacerbate symptoms (Moreton et al., 2019).

It remains unclear in the literature when a challenging NDE-like event will occur. Importantly, setting one's state of mind prior to consumption and setting an environment where the experience is taking place have been found to influence the likelihood of having a challenging experience with psychedelics (Barrett et al., 2017). Proper screening ahead of time for comorbidities is necessary and encouraged for this type of research, especially due to the profound and intense nature of an NDE-like or a psychedelic experience. With regard to VR research, participants in Barberia et al. (2018) have dropped out of the study due to motion sickness. Measuring for levels of dizziness prior to participation could be a valuable way of decreasing attrition. Overall, due the novelty of this field, and the risks of inducing NDE-like in vulnerable populations, future research should focus on developing screening techniques to avoid the potential harms associated with this type of research.

6. Concluding Remarks and Future Directions

Throughout this paper, the authors highlighted how death anxiety may negatively impact mental well-being and contribute to various mental disorders and provided some potential ways, both mundane and radical, for overcoming this type of anxiety. There is evidence that turning towards death-related

stimuli may be an effective treatment for death anxiety in clinical and non-clinical populations. The authors examined NDE literature to see how the associated benefits, like decreased fear of death, could be harnessed in a non-physiologically threatening manner. Meditation, psychedelics, and virtual reality are all potential avenues to treat pathological levels of death anxiety. In addition, a novel explanation was offered as to why NDEs have such drastic effects on death attitudes by applying recent work conducted on the Predictive Processing Framework. It is important to note that this is just the beginning of a theoretical connection between PPF and NDEs and future work should be pursued. Furthermore, the effects of targeting death anxiety as a mediating factor of symptom severity for disorders like OCD should be investigated in future empirical studies to establish efficacy compared to other standardized mental disorder treatments (Moreton et al., 2022). Lastly, additional research on virtual reality-induced NDEs may be valuable, as it could offer a safer methodology compared to psychedelic-induced NDEs.

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Mark Miller is supported in part by funding from the Social Sciences and Humanities Research Council and the Mathematical Metaphysics Institute.

References

AlZaben, M., & Al Adwan, F. (2022). The effectiveness of a counselling program in reducing the death anxiety and improving self-efficacy among a sample of female middle-aged teachers recovered from covid-19 virus. OMEGA - Journal of Death and Dying, 003022282210867. https://doi.org/10.1177/00302228221086704

Bailey, L. W. (2001). A "Little death": The near-death experience and Tibetan delogs. Journal of Near-Death Studies, 19(3). https://doi.org/10.17514/jnds-2001-19-3-p139-159.

Bandelow, B., Reitt, M., Röver, C., Michaelis, S., Görlich, Y., & Wedekind, D. (2015). Efficacy of treatments for anxiety disorders. International Clinical Psychopharmacology, 30(4), 183–192. https://doi.org/10.1097/yic.0000000000000078

Barberia, I., Oliva, R., Bourdin, P., & Slater, M. (2018). Virtual mortality and near-death experience after a prolonged exposure in a shared virtual reality may lead to positive life-attitude changes. PLOS ONE, 13(11). https://doi.org/10.1371/journal.pone.0203358

Barrett, F. S., Johnson, M. W., & Griffiths, R. R. (2017). Neuroticism is associated with challenging experiences with psilocybin mushrooms. Personality and Individual Differences, 117, 155–160. https://doi.org/10.1016/j.paid.2017.06.004

Bartalos, M. K., & Caffrey, T. A. (2009). When the time is ripe for acceptance: Dying, with a small d. In Speaking of death America's new sense of mortality (pp. 227–236). essay, Praeger.

Beauregard, M., Courtemanche, J., & Paquette, V. (2009). Brain activity in near-death experiencers during a meditative state. Resuscitation, 80(9), 1006–1010. https://doi.org/10.1016/j.resuscitation.2009.05.006 Becker, E. (1973). The denial of death. The Free Press.

Bianco, S., Testoni, I., Palmieri, A., Solomon, S., & Hart, J. (2019). The psychological correlates of decreased death anxiety after a near-death experience: The role of self-esteem, mindfulness, and death representations. Journal of Humanistic Psychology, 002216781989210. https://doi.org/10.1177/0022167819892107

Blomstrom, M., Burns, A., Larriviere, D., & Penberthy, J. K. (2020). Addressing fear of death and dying: Traditional and innovative interventions. Mortality, 27(1), 18–37. https://doi.org/10.1080/13576275.2020.1810649

Botîlcă, C.-M. (2021). Reclaiming death acceptance in the twenty-first century. Papers in Arts and Humanities, 1(1), 15–29. https://doi.org/10.52885/pah.v1i1.13

Bourdin, P., Barberia, I., Oliva, R., & Slater, M. (2017). A virtual out-of-body experience reduces fear of death. PLOS ONE, 12(1). https://doi.org/10.1371/journal.pone.0169343

Breitbart, W., Gibson, C., Poppito, S. R., & Berg, A. (2004). Psychotherapeutic interventions at the end of life: A focus on meaning and spirituality. The Canadian Journal of Psychiatry, 49(6), 366–372. https://doi.org/10.1177/070674370404900605

Brook, M. G. (2021). Struggles reported integrating intense spiritual experiences: Results from a survey using the integration of spiritually transformative experiences inventory. Psychology of Religion and Spirituality, 13(4), 464–481. https://doi.org/10.1037/rel0000258

Carhart-Harris, R. L., & Friston, K. J. (2019). Rebus and the anarchic brain: Toward a unified model of the brain action of psychedelics. Pharmacological Reviews, 71(3), 316–344. https://doi.org/10.1124/pr.118.017160

Carhart-Harris, R. L., & Goodwin, G. M. (2017). The therapeutic potential of psychedelic drugs: Past, present, and future. Neuropsychopharmacology, 42(11), 2105–2113. https://doi.org/10.1038/npp.2017.84

Carl, E., Stein, A. T., Levihn-Coon, A., Pogue, J. R., Rothbaum, B., Emmelkamp, P., Asmundson, G. J. G., Carlbring, P., & Powers, M. B. (2019). Virtual reality exposure therapy for anxiety and related disorders: A meta-analysis of randomized controlled trials. Journal of Anxiety Disorders, 61, 27–36. https://doi.org/10.1016/j.janxdis.2018.08.003

Cassidy, M. F. (2020). Meditating with corpses. Television and the Embodied Viewer, 115–160. https://doi.org/10.4324/9781315282657-5

Cassol, H., Martial, C., Annen, J., Martens, G., Charland-Verville, V., Majerus, S., & Laureys, S. (2019). A systematic analysis

of distressing near-death experience accounts. Memory, 27(8), 1122–1129. https://doi.org/10.1080/09658211.2019.1626438

Charland-Verville, V., Jourdan, J.-P., Thonnard, M., Ledoux, D., Donneau, A.-F., Quertemont, E., & Laureys, S. (2014). Near-death experiences in non-life-threatening events and coma of different etiologies. Frontiers in Human Neuroscience, 8. https://doi.org/10.3389/fnhum.2014.00203

Chiou, R.-J., Tsai, P.-F., & Han, D.-Y. (2023). Exploring the impacts of a coffin-lying experience on life and death attitudes of medical and nursing students: Preliminary findings. BMC Medical Education, 23(1). https://doi.org/10.1186/s12909-022-03975-7

Clark, A. (2016). Prediction-action machines. Surfing Uncertainty, 111–138. https://doi.org/10.1093/acprof:oso/9780190217013.003.0005

Curșeu, P. L., Coman, A. D., Panchenko, A., Fodor, O. C., & Rațiu, L. (2021). Death anxiety, death reflection and interpersonal communication as predictors of social distance towards people infected with covid 19. Current Psychology, 42(2), 1490–1503. https://doi.org/10.1007/s12144-020-01171-8

Deane, G. (2021). Consciousness in active inference: Deep self-models, other minds, and the challenge of psychedelic-induced ego-dissolution. Neuroscience of Consciousness, 2021(2). https://doi.org/10.1093/nc/niab024

Deane, G., Miller, M., & Wilkinson, S. (2020). Losing ourselves: Active inference, depersonalization, and meditation. Frontiers in Psychology, 11. https://doi.org/10.3389/fpsyg.2020.539726

Farias, M., Maraldi, E., Wallenkampf, K. C., & Lucchetti, G. (2020). Adverse events in meditation practices and meditation-based therapies: A systematic review. Acta Psychiatrica Scandinavica, 142(5), 374–393. https://doi.org/10.1111/acps.13225

Foa, E. B., & McLean, C. P. (2016). The efficacy of exposure therapy for anxiety-related disorders and its underlying mechanisms: The case of OCD and PTSD. Annual Review of Clinical Psychology, 12(1), 1–28. https://doi.org/10.1146/annurev-clinpsy-021815-093533

Furer, P., & Walker, J. R. (2008). Death anxiety: A cognitive-behavioral approach. Journal of Cognitive Psychotherapy, 22(2), 167–182. https://doi.org/10.1891/0889-8391.22.2.167

Gamino, L. A., & Ritter, R. H. (2012). Death competence: An ethical imperative. Death Studies, 36(1), 23–40. https://doi.org/10.1080/07481187.2011.553503

Gillett, C. B., Bilek, E. L., Hanna, G. L., & Fitzgerald, K. D. (2018). Intolerance of uncertainty in youth with obsessive-compulsive disorder and generalized anxiety disorder: A transdiagnostic construct with implications for phenomenology and treatment. Clinical Psychology Review, 60, 100–108. https://doi.org/10.1016/j.cpr.2018.01.007

Greyson, B. (1983). The near-death experience scale. The Journal of Nervous and Mental Disease, 171(6), 369–375. https://doi.org/10.1097/00005053-198306000-00007

Greyson, B. (2015). Western scientific approaches to near-death experiences. Humanities, 4(4), 775–796. https://doi.org/10.3390/h4040775

Greyson, B., & Evans Bush, N. (1992). Distressing near-death experiences. Psychiatry, 55(1), 95–110. https://doi.org/10.1080/00332747.1992.11024583

Griffiths, R. R., Johnson, M. W., Carducci, M. A., Umbricht, A., Richards, W. A., Richards, B. D., Cosimano, M. P., & Klinedinst, M. A. (2016). Psilocybin produces substantial and sustained decreases in depression and anxiety in patients with life-threatening cancer: A randomized double-blind trial. Journal of Psychopharmacology, 30(12), 1181–1197. https://doi.org/10.1177/0269881116675513

Heidenreich, T., Noyon, A., Worrell, M., & Menzies, R. (2021). Existential approaches and cognitive behavior therapy: Challenges and potential. International Journal of Cognitive Therapy, 14(1), 209–234. https://doi.org/10.1007/s41811-020-00096-1

Hesp, C., Smith, R., Parr, T., Allen, M., Friston, K., & Ramstead, M. J. (2019). Deeply felt affect: The emergence of valence in deep active inference. https://doi.org/10.31234/osf.io/62pfd

Hohwy, J. (2014). The Predictive Mind. Oxford University Press.

Iverach, L., Menzies, R. G., & Menzies, R. E. (2014). Death anxiety and its role in psychopathology: Reviewing the status of a transdiagnostic construct. Clinical Psychology Review, 34(7), 580–593. https://doi.org/10.1016/j.cpr.2014.09.002

Jain, G. (2023). Role of mindfulness meditation as moderating variable in reducing death anxiety. Mortality, 1–15. https://doi.org/10.1080/13576275.2023.2230149

Jock, A. M. (2024). The therapeutic importance of the study of the effects of the near-death experience. Theologia Viatorum, 48(1). https://doi.org/10.4102/tv.v48i1.212

Johansen, P., & Krebs, T. (2009). How could MDMA (ecstasy) help anxiety disorders? A neurobiological rationale. Journal of Psychopharmacology, 23(4), 389–391. https://doi.org/10.1177/0269881109102787

Khademi, F., Moayedi, S., Golitaleb, M., & karbalaie, N. (2020). The covid-19 pandemic and death anxiety in the elderly. International Journal of Mental Health Nursing, 30(1), 346–349. https://doi.org/10.1111/inm.12824

Khanna, S., & Greyson, B. (2015). Near-death experiences and posttraumatic growth. Journal of Nervous & Mental Disease, 203(10), 749–755. https://doi.org/10.1097/nmd.0000000000000362

Kissane, D. W., Bloch, S., Smith, G. C., Miach, P., Clarke, D. M., Ikin, J., Love, A., Ranieri, N., & McKenzie, D. (2003). Cognitive-existential group psychotherapy for women with primary breast cancer: A randomised controlled trial. Psycho-Oncology, 12(6), 532–546. https://doi.org/10.1002/pon.683

Kiverstein, J., Miller, M., & Rietveld, E. (2019). The feeling of grip: Novelty, error dynamics, and the predictive brain. Synthese, 196(7), 2847–2869. https://doi.org/10.1007/s11229-017-1583-9 LEMAY, K., & WILSON, K. (2008). Treatment of existential distress in life threatening illness: A review of manualized interventions . Clinical Psychology Review, 28(3), 472–493. https://doi.org/10.1016/j.cpr.2007.07.013

Human Brain Mapping, 36(8), 3137–3153. https://doi.org/10.1002/hbm.22833

Lemay K., & Wilson, K. (2008). Treatment of existential distress in life threatening illness: A review of manualized interventions. Clinical Psychology Review, 28(3), 472–493. https://doi.org/10.1016/j.cpr.2007.07.013

Lester, D. (1990). The Collett-lester fear of death scale: The original version and a revision. Death Studies, 14(5), 451–468. https://doi.org/10.1080/07481189008252385

Letheby, C., & Gerrans, P. (2017). Self unbound: Ego dissolution in psychedelic experience. Neuroscience of Consciousness, 2017(1). https://doi.org/10.1093/nc/nix016

Linson, A., Parr, T., & Friston, K. J. (2020). Active inference, stressors, and psychological trauma: A neuroethological model of (mal)adaptive explore-exploit dynamics in ecological context. Behavioural Brain Research, 380, 112421. https://doi.org/10.1016/j.bbr.2019.112421

Lo, C., Hales, S., Jung, J., Chiu, A., Panday, T., Rydall, A., Nissim, R., Malfitano, C., Petricone-Westwood, D., Zimmermann, C., & Rodin, G. (2013). Managing cancer and living meaningfully (calm): Phase 2 trial of a brief individual psychotherapy for patients with advanced cancer. Palliative Medicine, 28(3), 234–242. https://doi.org/10.1177/0269216313507757

Luke, D. (2012). Psychoactive substances and paranormal phenomena: A comprehensive review. International Journal of Transpersonal Studies, 31(1), 97–156. https://doi.org/10.24972/ijts.2012.31.1.97

Martial, C., Cassol, H., Charland-Verville, V., Pallavicini, C., Sanz, C., Zamberlan, F., Vivot, R. M., Erowid, F., Erowid, E., Laureys, S., Greyson, B., & Tagliazucchi, E. (2019). Neurochemical models of near-death experiences: A large-scale study based on the semantic similarity of written reports. Consciousness and Cognition, 69, 52–69. https://doi.org/10.1016/j.concog.2019.01.011

Martial, C., Fontaine, G., Gosseries, O., Carhart-Harris, R., Timmermann, C., Laureys, S., & Cassol, H. (2021). Losing the self in near-death experiences: The experience of ego-dissolution. Brain Sciences, 11(7), 929. https://doi.org/10.3390/brainsci11070929

McClatchey, I. S., & King, S. (2015). The impact of death education on fear of death and death anxiety among human services students. OMEGA - Journal of Death and Dying, 71(4), 343–361. https://doi.org/10.1177/0030222815572606

Menzies, R. E., & Dar-Nimrod, I. (2017). Death anxiety and its relationship with obsessive-compulsive disorder. Journal of Abnormal Psychology, 126(4), 367–377. https://doi.org/10.1037/abn0000263

Menzies, R. E., & Menzies, R. G. (2023). Death anxiety and mental health: Requiem for a dreamer. Journal of Behavior Therapy and Experimental Psychiatry, 78, 101807. https://doi.org/10.1016/j.jbtep.2022.101807

Menzies, R. E., & Veale, D. (2022). Creative approaches to treating the dread of death. Existential Concerns and Cognitive-Behavioral Procedures, 75–92. https://doi.org/10.1007/978-3-031-06932-1_5

Menzies, R. E., Julien, A., Sharpe, L., Menzies, R. G., Helgadóttir, F. D., & Dar-Nimrod, I. (2023). Overcoming death anxiety: A phase I trial of an online CBT program in a clinical sample. Behavioural and Cognitive Psychotherapy, 1–6. https://doi.org/10.1017/s135246582300005x

Menzies, R. E., Sharpe, L., & Dar-Nimrod, I. (2019). The relationship between death anxiety and severity of mental illnesses. British Journal of Clinical Psychology, 58(4), 452–467. https://doi.org/10.1111/bjc.12229

Menzies, R. E., Sharpe, L., Dar-Nimrod, I., & Helgadottir, F. (2021). Overcome death anxiety: The development of an online CBT program for FEARS OF DEATH. https://doi.org/10.31234/osf.io/635pn

Menzies, R. E., Zuccala, M., Sharpe, L., & Dar-Nimrod, I. (2018). The effects of psychosocial interventions on death anxiety: A meta-analysis and systematic review of Randomised Controlled Trials. Journal of Anxiety Disorders, 59, 64–73. https://doi.org/10.1016/j.janxdis.2018.09.004

Menzies, R. E., Zuccala, M., Sharpe, L., & Dar-Nimrod, I. (2020). Subtypes of obsessive-compulsive disorder and their relationship to death anxiety. Journal of Obsessive-Compulsive and Related Disorders, 27, 100572. https://doi.org/10.1016/j.jocrd.2020.100572

Meyer, J. M., Farrell, N. R., Kemp, J. J., Blakey, S. M., & Deacon, B. J. (2014). Why do clinicians exclude anxious clients from exposure therapy? Behaviour Research and Therapy, 54, 49–53. https://doi.org/10.1016/j.brat.2014.01.004

Miller, M., Kiverstein, J., & Rietveld, E. (2021). The predictive dynamics of happiness and well-being. Emotion Review, 14(1), 15–30. https://doi.org/10.1177/17540739211063851

Miller, M., White, B., & Scrivner, C. (2023). Surfing uncertainty with screams: Predictive processing, error dynamics and horror films. https://doi.org/10.31234/osf.io/t2xrb

Miller-Lewis, L., Tieman, J., Rawlings, D., Parker, D., & Sanderson, C. (2018). Can exposure to online conversations about death and Dying Influence Death Competence? an exploratory study within an australian massive open online course. OMEGA - Journal of Death and Dying, 81(2), 242–271. https://doi.org/10.1177/0030222818765813

Miller-Lewis, L., Tieman, J., Rawlings, D., Sanderson, C., & Parker, D. (2019). Correlates of perceived death competence: What role does meaning-in-life and quality-of-life play? Palliative and Supportive Care, 17(5), 550–560. https://doi.org/10.1017/s1478951518000937

Millière, R. (2017). Looking for the self: Phenomenology, neurophysiology and philosophical significance of drug-induced ego dissolution. Frontiers in Human Neuroscience, 11. https://doi.org/10.3389/fnhum.2017.00245

Moon, H. G. (2019). Mindfulness of death as a tool for mortality salience induction with reference to terror management theory. Religions, 10(6), 353. https://doi.org/10.3390/rel10060353

Moreton, S. G., Burden-Hill, A., & Menzies, R. E. (2022). Reduced death anxiety and obsessive beliefs as mediators of the therapeutic effects of psychedelics on obsessive

Lebedev, A. V., Lövdén, M., Rosenthal, G., Feilding, A., Nutt, D. J., & Carhart-Harris, R. L. (2015). Finding the self by losing the self: Neural correlates of ego-dissolution under compulsive compulsive disorder symptomology. Clinical Psychologist, 27(1), 58–73. https://doi.org/10.1080/13284207.2022.2086793

Moreton, S. G., Szalla, L., Menzies, R. E., & Arena, A. F. (2019). Embedding existential psychology within psychedelic science: Reduced death anxiety as a mediator of the therapeutic effects of psychedelics. Psychopharmacology, 237(1), 21–32. https://doi.org/10.1007/s00213-019-05391-0

Nave, K., Deane, G., Miller, M., & Clark, A. (2020). Wilding the predictive brain. WIREs Cognitive Science, 11(6). https://doi.org/10.1002/wcs.1542

Norman, S. B., Trim, R., Haller, M., Davis, B. C., Myers, U. S., Colvonen, P. J., Blanes, E., Lyons, R., Siegel, E. Y., Angkaw, A. C., Norman, G. J., & Mayes, T. (2019).

Oosterwijk, S., Snoek, L., Tekoppele, J., Engelbert, L., & Scholte, H. S. (2019). Choosing to view morbid information involves reward circuitry. https://doi.org/10.1101/795120

Orłowski, P., Ruban, A., Szczypiński, J., Hobot, J., Bielecki, M., & Bola, M. (2022). Naturalistic use of psychedelics is related to emotional reactivity and self-consciousness: The mediating role of ego-dissolution and mystical experiences. Journal of Psychopharmacology, 36(8), 987–1000. https://doi.org/10.1177/02698811221089034

Pehlivanova, M., Carroll, A., & Greyson, B. (2022). Which near-death experience features are associated with reduced fear of death? Mortality, 1–17. https://doi.org/10.1080/13576275.2021.2017868

Penberthy, J. K., Russell, G., Phillips, J., Banaji, M., Mann, N., & Dameron, E. (2020). Medical stress and fear of death and dying in a medical patient population. OMEGA - Journal of Death and Dying, 86(1), 255–270. https://doi.org/10.1177/0030222820966926

Racz, J. I., Bialocerkowski, A., Calteaux, I., & Farrell, L. J. (2024). Determinants of exposure therapy implementation in clinical practice for the treatment of anxiety, OCD, and PTSD: A systematic review. Clinical Child and Family Psychology Review. https://doi.org/10.1007/s10567-024-00478-3

Renz, M., Reichmuth, O., Bueche, D., Traichel, B., Mao, M. S., Cerny, T., & Strasser, F. (2017). Fear, pain, denial, and spiritual experiences in dying processes. American Journal of Hospice and Palliative Medicine®, 35(3), 478–491. https://doi.org/10.1177/1049909117725271

Ruzek, J. I., Eftekhari, A., Rosen, C. S., Crowley, J. J., Kuhn, E., Foa, E. B., Hembree, E. A., & Karlin, B. E. (2014). Factors related to clinician attitudes toward prolonged exposure therapy for PTSD. Journal of Traumatic Stress, 27(4), 423–429. https://doi.org/10.1002/jts.21945

Sabom, M. B. (1983). Recollections of death: A medical investigation. Simon & Schuster.

Sandved-Smith, L., Hesp, C., Mattout, J., Friston, K., Lutz, A., & Ramstead, M. J. (2021). Towards a computational phenomenology of mental action: Modelling meta-awareness and attentional control with deep parametric active inference. Neuroscience of Consciousness, 2021(1). https://doi.org/10.1093/nc/niab018

Scott, G., & Carhart-Harris, R. L. (2019). Psychedelics as a treatment for disorders of consciousness. Neuroscience of Consciousness, 2019(1). https://doi.org/10.1093/nc/niz003

Sinapayen, L., Masumori, A., & Ikegami, T. (2017). Learning by stimulation avoidance: A principle to control spiking neural networks dynamics. PLOS ONE, 12(2). https://doi.org/10.1371/journal.pone.0170388

Sloan, E., Hall, K., Moulding, R., Bryce, S., Mildred, H., & Staiger, P. K. (2017). Emotion regulation as a transdiagnostic treatment construct across anxiety, depression, substance, eating and borderline personality disorders: A systematic review. Clinical Psychology Review, 57, 141–163. https://doi.org/10.1016/j.cpr.2017.09.002

Stoliker, D., Egan, G. F., & Razi, A. (2021). Reduced precision underwrites ego dissolution and therapeutic outcomes under psychedelics. https://doi.org/10.31234/osf.io/dzswq

Strachan, E., Schimel, J., Arndt, J., Williams, T., Solomon, S., Pyszczynski, T., & Greenberg, J. (2007). Terror mismanagement: Evidence that mortality salience exacerbates phobic and compulsive behaviors. Personality and Social Psychology Bulletin, 33(8), 1137–1151. https://doi.org/10.1177/0146167207303018

Tassell-Matamua, N. A. (2014). Near-death experiences and the psychology of death. OMEGA - Journal of Death and Dying, 68(3), 259–277. https://doi.org/10.2190/om.68.3.e

Timmermann, C., Roseman, L., Williams, L., Erritzoe, D., Martial, C., Cassol, H., Laureys, S., Nutt, D., & Carhart-Harris, R. (2018). DMT models the near-death experience. Frontiers in Psychology, 9. https://doi.org/10.3389/fpsyg.2018.01424

Vail, K. E., Juhl, J., Arndt, J., Vess, M., Routledge, C., & Rutjens, B. T. (2012). When death is good for life. Personality and Social Psychology Review, 16(4), 303–329. https://doi.org/10.1177/1088868312440046

Van Gordon, W., Shonin, E., Dunn, T. J., Sheffield, D., Garcia-Campayo, J., & Griffiths, M. D. (2018). Meditation-induced near-death experiences: A 3-year longitudinal study. Mindfulness, 9(6), 1794–1806. https://doi.org/10.1007/s12671-018-0922-3

van Lommel, P. (2011). Near-death experiences: The experience of the self as real and not as an illusion. Annals of the New York Academy of Sciences, 1234(1), 19–28. https://doi.org/10.1111/j.1749-6632.2011.06080.x

van Lommel, P., van Wees, R., Meyers, V., & Elfferich, I. (2001). Near-death experience in survivors of cardiac arrest: A prospective study in the Netherlands. The Lancet, 358(9298), 2039–2045. https://doi.org/10.1016/s0140-6736(01)07100-8

VanArendonk, K. (2020). Why is pandemic fiction so comforting right now? Vulture. Retrieved April 12, 2023, from https://www.vulture.com/2020/03/contagion-coronavirus-pandemic-fiction.html

Van de Cruys, S. (2017). Affective Value in the Predictive Mind. In T. Metzinger , & W. Wiese, Philosophy and Predictive Processing.

Villiger, D. (2022). How psychedelic-assisted treatment works in the Bayesian brain. Frontiers in Psychiatry, 13. https://doi.org/10.3389/fpsyt.2022.812180

Yehuda, R., & LeDoux, J. (2007). Response variation following trauma: A translational neuroscience approach to understanding PTSD. Neuron, 56(1), 19–32. https://doi.org/10.1016/j.neuron.2007.09.006

Zbozinek, T. D., Rose, R. D., Wolitzky-Taylor, K. B., Sherbourne, C., Sullivan, G., Stein, M. B., Roy-Byrne, P. P., & Craske, M. G. (2012). Diagnostic overlap of generalized anxiety disorder and major depressive disorder in a primary care sample. Depression and Anxiety, 29(12), 1065–1071. https://doi.org/10.1002/da.22026

Zhao, N., Liu, B., & Wang, Y. (2022). Examining the relationship between death anxiety and well-being of frontline medical staff during the COVID-19 pandemic. International Journal of Environmental Research and Public Health, 19(20), 13430. https://doi.org/10.3390/ijerph192013430

Zheng, R., Bloomer, M. J., Guo, Q., & Lee, S. F. (2020). New Graduate Nurses' coping with death and the relationship with Death Self-efficacy and death anxiety: A multicentre cross-sectional study. Journal of Advanced Nursing, 77(2), 795–804. https://doi.org/10.1111/jan.14621

Anh Vu, BA in Psychology, University of Rochester

Anh Vu graduated from the University of Rochester in 2024 with a bachelor's degree in psychology. As an undergraduate they were a research assistant in multiple social psychology labs where they found and grew their love for psychological research. Their interests broadly include research on LGBTQ+ populations, relationships, well-being, and alternative modes of social satisfaction in the modern world. Anh hopes to pursue graduate studies in these areas in the future, but in the meantime, they are taking time to accrue work and life experience to enrich their future endeavors.

Was there a particular experience that sparked your research interests?

As someone who witnessed the birth and growth of a lot of modern social media platforms and as a queer person myself, I wouldn't say there was any one thing that sparked my research interests. I do recall, however, a moment when I was taking a course on the psychology of relationships seeing a single line on a single PowerPoint slide on parasocial relationships. It described what they were but did little to elaborate. Still, something about the concept just stuck with me especially as I examined their role in my own life and in the lives of others.

Who has been the most influential person in your life?

For myself and many others, research is not just about forging pathways into the future, it's also about examining the past and reevaluating the findings and research that came out of it. As a third-year student, I happened to enroll in a course on relationship psychology that was taught by Dr. Harry Reis, the man who would go on to become my thesis advisor and mentor. While it was one of the best courses I took as an undergraduate, I often found myself with a furrowed brow or flummoxed expression. I found the fixation on romantic relationships and on heterosexual couples in much of the literature to be narrow and felt very strongly that there was more that could be done. When I came to him about this feeling, my mentor encouraged me to be the one to do it and I've continued to take his advice since!

What is your greatest accomplishment?

My greatest accomplishment (thus far) has been the completion of my undergraduate honors thesis project. It was incredibly fulfilling to see the project through from the planning and conception phase to presenting it before an audience of both my trusted mentors and peers. The experience was so different than anything I had done as a research assistant. It was challenging and incredibly exciting at the same time.

Where do you see yourself in 10 years?

In 10 years, I see myself continuing to do research on what sparks my curiosity and passion. I have always had a deep respect for my teachers and professors, so I hope to be in a teaching role where I can share my love for research and passion for this subject matter as well. Other than that, two cats would be nice! And a mortgage too!

Icons and Idols: Parasocial Relationship Development and Implications for Well-Being for LGBTQ+ Individuals

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Acknowledgements

Thank you to Dr. Harry T. Reis and Emefa Amoah for their unwavering support and guidance throughout the course of this project. Thank you as well to the University of Rochester Office of Undergraduate Research and the organizers of the Barth-Crapsey Award for their support in facilitating and funding this research.

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Parasocial relationships (PSR) are lasting, one-sided intimate connections that individuals develop with media figures (e.g., celebrities and fictional characters). Individuals who experience difficulties forming real-life relationships may be especially likely to reap relational benefits from parasocial relationship partners. The goal of the following studies was to examine parasocial relationships within the context of a relationally vulnerable population: LGBTQ+ adults. Study 1 examined factors that may contribute to PSR strength (i.e., a measure indicative of PSR development), such as loneliness, perceived similarity, attraction, repeated exposure, current relationship satisfaction, minority stress, and perceived PSR partner responsiveness. Study 2 used an experimental design to determine if engagement with a chosen PSR partner results in improved mental well-being following a negative social experience, paralleling the effects of receiving social support. The results of both studies suggest that many of the same factors that influence real-life relationship development also influence PSR development. For LGBTQ+ people, who may feel misunderstood and are often actively harassed for their identities, perceiving responsiveness from a PSR partner in times of crisis may help to buffer and regulate negative emotions and stress when real-life relationships are not easily accessible. Limitations to these studies include the use of an adult population in Study 1 and the lack of a baseline condition and an unnaturalistic study environment in Study 2. Future research should continue to explore how PSRs confer benefits to populations that experience difficulty forming and maintaining relationships. Researchers should also continue to examine how perceived responsiveness (an inherently two-sided experience) relates to parasocial relationships and interactions.

Keywords: Parasocial relationships, LGBTQ+ population, well-being, perceived partner responsiveness, loneliness.

Introduction

Parasocial relationships (PSRs) were first written about by Horton and Wohl (1956) and described as lasting, one-sided intimate connections that television viewers develop with television personalities. Since then, PSRs have continued to be studied by media and interpersonal relationship researchers resulting in a flourishing—albeit small—body of literature that extends beyond the scope of TV-viewing and TV personalities. In an era of ever-increasing media prevalence in daily life, individuals can potentially form PSRs with anyone—fictional characters, celebrities, social media influencers, etc.—and they have more access to their favorite media figures than ever before thanks to social media and the internet. Additionally, as the prevalence of PSRs increases over time, and people spend more and more time engaging with media figures (and perhaps, less with real people), it is important to examine how these "interactions" and "relationships" impact mental health and well-being. As such, the present research examines the parallels between PSRs and real relationships, specifically regarding the impact of PSRs on well-being.

PSR Development & the Substitution Hypothesis

Extant research on PSRs predominantly examines antecedents to PSR development and the strength of parasocial bonds. This body of work has been guided by two foundational theories: the substitution hypothesis and the Panksepp-Jakobson hypothesis (Tukachinsky et al., 2020). The substitution hypothesis, one of the pioneering theories on PSRs, is rooted in the uses and gratifications theory. This theory proposes that individuals actively seek out media—and as an extension, PSR media partners—to satisfy their emotional, cognitive, and social needs. In other words, individuals are motivated to seek out PSRs for the same reasons they seek out real-life relationships. Paralleling the need to assess individuals' real-world relationship quality, understanding PSR strength (i.e., the significance and intensity of an individual's bond to their PSR partner) is crucial in examining the formation and function of PSR relationships.

In support of the uses and gratifications theory, factors such as attraction, perceived similarity, and repeated exposure to one's partner is a major determinant of PSR strength (Rubin & McHugh, 1987; Giles, 2002; Hoffner & Buchanan, 2005; Reis et al., 2011; Tian & Hoffner, 2010; Tsay & Bodine, 2012; Bond et al., 2018). Expanding on this, the substitution hypothesis posits that individuals with unmet social needs may form PSRs as a way to form social bonds without fear of rejection and a need for highly sophisticated social skills. Said differently, individuals lacking high-quality real-life relationships—typically due to poor social skills—may form PSRs to compensate for deficiencies in their social bonds (Tukachinsky et al., 2020).

While the substitution hypothesis appears intuitive and theoretically sound, existing empirical work has yielded mixed findings. Tukachinsky et al.'s (2020) meta-analysis of existing PSR research, spanning from 1979 to 2019, examined the relationship between PSR strength and social deficiencies that the substitution hypothesis suggests are associated with insufficient social connections (e.g., loneliness, shyness, low self-esteem, and attachment anxiety; Ashe & McCutheon, 2001; David et al., 2019; Dhanda et al., 2009; Rosaen & Dibble, 2016; Wang et al., 2008). Contrary to the substitution hypothesis' theorizing, while attachment anxiety was found to be significantly associated with loneliness, shyness, and low self-esteem, Tukachinsky et al. (2020) found no such relationships with PSR strength. In other words, the results were mixed and case-by-case. These findings challenge the substitution hypothesis' assumption that social deficiencies explain PSR development because, if people truly form PSRs in order to compensate for unsatisfactory real-life relationships, then loneliness, shyness, and low self-esteem—traits associated with difficulty forming high-quality relationships—should have been associated with PSR strength. However, if social deficiencies were not a contributing factor, attachment anxiety should not so consistently demonstrate a strong association with PSR strength. It is clear that there is more to PSR development than early theorists first envisioned.

Alternative Explanations for PSR Devleopment

One explanation for Tukachinsky et al.'s (2020) counterintuitive findings is that the substitution hypothesis simply does not adequately capture the true nature of PSR's development and impact. Instead, some PSR researchers have proposed the Panksepp-Jakobson hypothesis which suggests that factors and characteristics that foster real-life relationship formation would similarly motivate the way individuals form PSRs with media figures (Eyal & Cohen, 2006; Rosaen & Dibble, 2016; Rubin, Perse, & Powell, 1985).

That being said, research conducted by Bond et al. (2018) presents another alternative framework of understanding PSR development. In this study, Bond et al. (2018) proposed that previous research testing the substitution hypothesis approached understanding PSRs too broadly. They argued that the substitution hypothesis better explains PSRs when applied to specific demographic populations, particularly those that are most susceptible to loneliness and its negative effects on well-being. In order to examine this idea, Bond et al. (2018) attempted to find a relationship between PSR strength and loneliness among lesbian, gay, and bisexual (LGB) adolescents. Bond et al. (2018) first argued that LGB adolescents are more at risk for depression, anxiety, and other negative well-being outcomes compared to heterosexual adolescents (Meyer, 2003). Moreover, while peer relationships provide social support (e.g., emotional, instrumental, informational, and appraisal support) that buffers the negative effects of these stressors, LGB adolescents experience difficulties in forming and maintaining close relationships due to fears of rejection or prejudice that arise from being belonging to a stigmatized population (Berndt, 1996; Bond, 2011; Diamond & Lucas, 2004). With that, this study posited that PSRs may offer LGB adolescents an avenue to not only safely receive social support from like-others (e.g., LGB PSR partners), but also to explore their LGB identities without fear of rejection or stigmatization. Supporting this theorizing, they surveyed a pool of adolescents and found that loneliness predicted PSR strength solely for those who self-identified as LGB, and not their cis-heterosexual peers. Furthermore, they found that LGB adolescents were significantly more likely to report an LGB PSR partner compared to their cisgender-heterosexual peers—this was the case especially for LGB adolescents who lacked interpersonal relationships with other LGB people. LGB adolescents who lacked real-life LGB relationships also reported stronger PSRs (Bond et al., 2018). Taken together, these results suggest that there are contextual factors surrounding whether PSRs can indeed compensate for the lack of real-life relationships.

The Present Research

Bond et al.'s study (2018) was published over five years before I conducted my research in 2023. Since then, societal attitudes toward LGBTQ+ individuals have changed dramatically in both positive and negative ways. With an ever-growing presence of queer people being represented in fiction,

film, the news, etc., it is important to revisit this research—its findings and implications—to see how these societal changes have affected them.

Building on previous research conducted within the field of PSR research and by Bond et al. (2018), Study 1 sought to replicate previous findings in a novel population (LGBTQ+ adults) and establish new connections to previously unexplored concepts. Study 1's hypotheses were as follows:

H1: Perceived similarity, attraction, and repeated exposure will be positively associated with PSR strength.

H2: LGBTQ+ status will moderate the relationship between loneliness and PSR strength, to where loneliness will only predict greater PSR strength in LGBTQ+ adults and not heterosexual adults.

These first two hypotheses were meant to replicate Bond et al. (2018)'s core findings. I also wanted to extend and build upon some of the findings from Bond et al. (2018) in important ways. First, in the original study, Bond et al. (2018) predicted that LGB participants would be more likely to report LGBTQ+ PSR partners than their cis-straight peers. The present research includes PSR partners that are perceived as "queer" (a.k.a. "queer-coded;" characters or people who are not explicitly queer but are perceived to have queer traits and characteristics). Furthermore, this research integrated LGBTQ+ minority stress (i.e., perceived rejection) as a contributor to PSR strength. Bond et al. (2018) argued that minority stress impedes real-life support-seeking and relationship formation which then, in turn, opens the door for PSRs. If this is indeed the case, then an association between minority stress and PSR strength may be found. The hypotheses are as follows:

H3: LGBTQ+ participants will be significantly more likely to report an LGBTQ+ or "queer-coded" PSR partner than cisgender and heterosexual participants.

H4: LGBTQ+ status will moderate the relationship between perceived rejection and PSR strength, to where LGBTQ+ participants who report high levels of perceived rejection will report greater PSR strength

Finally, we investigated factors that had not yet been examined in relation to PSR strength, such as real-life relationship satisfaction (the degree to which one feels that one's relationships are fulfilling one's needs for social connection) and perceived partner responsiveness (PPR; the degree to which one feels that one's relationship partner is understanding, validating, and caring). Real-life relationship dissatisfaction, specifically, was of interest given its close proximity to loneliness. Additionally, the substitution hypothesis itself identifies perceptions of poor quality and quantity in relationships as a catalyst for PSR development. Because PPR is a relationship quality that enhances and strengthens real-life relationships, this work extends the Panksepp-Jakobson hypothesis that PSRs function similarly to real-life relationships (Reis et al., 2018). For these novel explorations, I proposed the following hypotheses:

H5: Real-life relationship satisfaction will be negatively associated with PSR strength for all participants.

H6: Perceived PSR responsiveness will be positively associated with PSR strength.

In addition to these hypotheses, I also included a variety of measures to conduct exploratory analyses without making any prior predictions, such as measures of the need to belong, life satisfaction, and attachment style.

Given the mixed findings of the Substitution Hypothesis, Study 2 was an experimental test of the proposition that PSRs substitute real-life relationships to meet otherwise unmet social and emotional needs. Specifically, Study 2 tested whether PSRs successfully substitute for a real-life relationship when social support is desired following a stressful event. In this study, LGBTQ+ participants disclosed in an online survey about a negative, stressful experience of rejection, isolation, or exclusion resulting from their status as an LGBTQ+ person. Afterwards, they either discussed their PSR partner or a neutral topic and completed a measure of current mood and emotions to evaluate whether there are differences in the effects on well-being that result from PSR partner "interaction." The predictions for Study 2 were as follows:

H7a: LGBTQ+ participants who engage with their parasocial partner after experiencing rejection will experience higher levels of positive emotions and comfort and lower levels of negative emotions compared to LGBTQ+ participants who do not engage with their parasocial partner.

H7b: This effect will be moderated by PSR strength.

The overarching goal of this research is to contribute novel insight into PSRs' complexities by replicating and expanding on prior PSR work. We believe that the nature of PSR development and the ways they function for individuals who hold them are more contextual and complex than previous search has found.

Study 1

Methods

Sample

The sample consisted of 479 individuals between the ages of 18 and 35 years old who spoke English as their primary language. 99 responses were excluded from the final analyses because participants failed to complete 70% of the survey or failed both attention checks in the survey, leaving 380 participants total (N = 380). This specific sample was chosen because it encompasses, as of 2022, a range of adults who would have grown up and spent a significant amount of time engaging with media and the internet, giving ample opportunities to form parasocial relationships with figures in media. Survey data was collected from the University of Rochester SONA pool (N = 54) and Research Match (N = 326).

The average age of participants was 24.88 years old (SD = 4.26), and their PSR partners averaged 33.32 years old (SD = 10.76). Of the 380 participants recruited, 68.7% were white, 9.7% were Asian, 7.9% were Black or African American, and the

remaining 3.7% identified with other racial identities. Additionally, 15% of participants identified as Latino/a/x, 3.9% as Hispanic, and 1.6% as Spanish. This sample included a wide range of gender identities with 60.8% of participants identifying as women, 14.7% as men, 5.5% as non-binary, 2.4% as genderqueer, gender non-conforming, or genderfluid, 1.1% as transmen, and the remainder as unsure or as a gender not listed. This sample also included an even greater diversity of sexual orientations with 37.4% of participants identifying as heterosexual or straight, 20.8% as bisexual, 7.1% as queer, 4.2% as lesbian, 3.2% as pansexual, 2.6% as asexual, 2.4% as gay, and the remaining as unsure or as unlisted sexual orientations.

Measures

After being asked to name a favorite figure from media in a textbox (e.g. "Who is your favorite media figure [e.g. actor/actress, singer, fictional character, social media influencer, etc.]?"), participants were then asked to provide answers to a series of questions regarding the PSR partner themselves, including a question about the PSR partner's estimated age and whether the participant believed their PSR partner to be LGBTQ+, "queer-coded," or neither.

PSR Strength. The strength of the participant's relationship with their PSR partner was measured using the Parasocial Relationship Scale (Rosaen & Dibble, 2008). Because the items in the original scale were specific to participants' favorite "TV personality," the items were modified to ask about participants' "favorite media figure" instead to include a wide variety of media formats (e.g., "I think of my favorite media figure like an old friend."). The scale contained 13 items and answers were recorded using a 7-point Likert scale ranging from strongly disagree to strongly agree. Cronbach's alpha was .81.

Exposure to PSR. The frequency of exposure to the participant's PSR partner was measured across a multitude of platforms (on television, in film, on the internet, on social media, etc.) using items from Bond et al. (2018)'s original study (e.g., "How often do you engage with your favorite media figure on TV?"). The scale contained 6 items and answers were recorded using a 7-point Likert scale ranging from not at all to very often. Cronbach's alpha was .59.

Perceived Similarity. The participant's perceived similarity (the degree to which an individual believes themself to share traits and beliefs with another) to their PSR partner was measured using the Audience-Persona Interaction Scale (e.g., "My favorite media figure reminds me of myself."). The scale contained 6 items and answers were recorded using a 7-point Likert scale ranging from strongly disagree to strongly agree. Cronbach's alpha was .84.

Perceived Attractiveness. The participant's attraction to their PSR partner was measured using 3 items from Bond et al. (2018) (e.g., "My favorite media figure is physically attractive."). Answers were recorded using a 7-point Likert scale ranging from strongly disagree to strongly agree. Cronbach's alpha was .82.

Perceived Partner Responsiveness. The participant's perceptions of their PSR partner's responsiveness were measured using Reis et al. (2018)'s Perceived Partner Responsiveness (PPR) Scale. Participants were asked to envision a scenario in which they had a real relationship with their PSR partner and were then asked to what degree they agreed with certain statements regarding perceived partner responsiveness (e.g., "My favorite media figure usually is responsive to my needs."). The scale contained 17 items and answers were recorded using a 7-point Likert scale ranging from not true to completely true. Cronbach's alpha for the PPR Scale was .98.

Loneliness. The participant's experience of loneliness was measured using Hughes et al. (2004)'s Three-Item Loneliness Scale (e.g., "How often do you feel that you lack companionship?"). Answers were recorded using a 7-point Likert scale ranging from hardly ever to all the time. Cronbach's alpha for the UCLA Loneliness Scale was .88.

Perceived Rejection-Acceptance and Minority Stress. For this block, data was only collected from participants who self-identify as LGBTQ+. The participant's experience of social rejection based on their LGBTQ+ identity was measured using a combination of items from Ross (1985)'s Acceptance-Rejection Scale (e.g., "My mother is accepting of my LGBTQ+ identity."). The Everyday Discrimination/Microaggressions Subscale and the Discrimination Events Subscale were taken from the LGBT Minority Stress Measure (Outland, 2016) in order to encompass a wide range of negative social experiences that LGBTQ+ individuals face on a regular basis (e.g., "People are likely to break off a social relationship with me if they know I am LGBTQ+."). The scale contained 21 items and answers were recorded using a 7-point Likert scale ranging from strongly disagree to strongly agree. Cronbach's alpha was .75 for the Acceptance-Rejection Scale and .92 for the Minority Stress Scale.

Friendship and Relationship Satisfaction. The participants' satisfaction with the quality and quantity of their current relationships were measured with 6 items, three regarding their friendships and three regarding their romantic relationships, respectively. Participants were asked to indicate the degree to which they agreed with statements concerning their friendships (e.g., "I am satisfied with the number of friendships I have right now.") and current romantic relationship (e.g., "I am satisfied with how close I am with my romantic partner."). The answers were recorded using a 7-point Likert scale ranging from strongly disagree to strongly agree. Cronbach's alpha was .74 for friendship satisfaction and .53 for relationship satisfaction.

Demographics. The participant's age, race/ethnicity, sexual orientation, and gender identity were collected at the end of the survey.

Resource Page. At the end of the survey, participants were provided with a resource page for LGBTQ+ individuals as well as the research coordinator's contact information in case they had any questions or concerns they wished to express. This was done in order to ensure that any additional negative emotional or psychological effects of the study could be addressed.

Results

Multiple linear regression models were used to test each hypothesis save for hypothesis 3. Hypothesis 3 was tested using a chi-squared difference test. Descriptive statistics and the correlation between each variable of interest are reported in Table 1.

H1: Perceived similarity, attraction, and repeated exposure will be positively associated with PSR strength.

Perceived similarity, attraction, and repeated exposure were entered as predictors of PSR strength individually. Individuals' perceived similarity to their partner (β = .38, p < .001), exposure to their PSR partner (β = .27, p < .001), and their attraction to their PSR partner (β = .13, p < .001) were all positively significantly associated with greater PSR strength (Table 2). Meaning, the more participants perceived their PSR partners were similar to them, the more they were exposed to their PSR partners, and the more they were attracted to their PSR partner, the stronger the PSR. Hypothesis 1 was supported, successfully replicating the results of Bond et al. (2018).

Table 1. Study 1 correlation matrix and descriptive statistics

Variables	M	SD	1	2	3	4	5	6	7	8
1. PSR Strength	5.24	.79	--							
2. PSR Similarity	4.20	1.19	.43**	--						
3. PSR Exposure	4.91	1.47	.34**	.18**	--					
4. PSR Attraction	6.14	.99	.13*	.00	.01	--				
5. PSR PPR	4.30	1.65	.43**	.39**	.20**	-.01	--			
6. Loneliness	3.90	1.54	.11*	.06	.05	-.01	.07	--		
7. Need to Belong	4.95	1.03	.09	.05	.04	.14**	-.01	.21**	--	
8. Relationship Satisfaction	4.67	1.14	-.01	.07	.04	.01	.05	-.22**	-.13*	--
9. Friendship Satisfaction	4.28	1.42	-.01	-.05	.00	-.03	-.03	-.57**	-.22**	.18**
10. Attachment Avoidance	3.80	1.13	.08	.10	.09	-.09	.00	.51**	-.11*	-.21**
11. Attachment Anxiety	4.19	.94	.14**	.11*	.12*	.04	.00	.58**	.31**	-.28**
12. Life Satisfaction	21.53	6.71	.00	.04	-.01	.08	.05	-.56**	-.09	.23**
LGBTQ+ Variables										
13. Minority Stress	2.90	1.31	.03	.05	-.01	-.11	-.03	.18*	.05	.07
14. Perceived Rejection	1.98	1.21	-.07	.08	-.07	-.10	-.06	.18**	.15*	-.09
15. Connectedness	2.29	.90	-.12	-.09	-.01	-.21**	-.09	.16*	-.11	.04

Note: Pearson correlations values. PSR for parasocial relationship, PPR for perceived partner responsiveness, **p < 0.01, *p < 0.05

Table 2. H1: PSR perceived similarity, attraction, and exposure predicting PSR strength

Predictor	β	*SE*	*t*	*p*
PSR Perceived Similarity	0.38	0.03	8.36	<.001
PSR Exposure	0.27	0.02	5.98	<.001
PSR Attraction	0.13	0.03	2.94	0.004

Outcome variable: PSR Strength

H2: Loneliness will only have a positive relationship with PSR Strength among LGBTQ+ participants.

To test the interaction between PSR strength, loneliness and LGBTQ+ status, multiple linear regressions were run, with loneliness, LGBTQ+ status, and LGBTQ+ x Loneliness entered as predictors (Table 3). LGBTQ+ status was coded by participant self-reports of sexual orientation and gender identity. Contrary to the results of Bond et al. (2018), LGBTQ+ status did not significantly moderate the relationship between loneliness and PSR strength (β = -.04, p < .05). However, there was a significant positive main effect of loneliness predicting PSR strength (β = .11, p < .05) (Table 4).

Table 3. H2: Sexuality x Loneliness moderation predicting PSR strength

Predictor	β	*SE*	*t*	*p*
Loneliness	0.13	0.04	1.60	0.11
LGBTQ+	0.09	0.16	0.84	0.40
Loneliness x LGBTQ	-0.04	0.06	-0.34	0.74

Outcome variable: PSR Strength

Table 4. Loneliness predicting PSR strength

Predictor	β	*SE*	*t*	*p*
Loneliness	0.11*	0.03	2.05	0.04

Outcome variable: PSR Strength

H3: LGBTQ+ participants will be more likely to report a LGBTQ+ or "queer-coded" PSR than cisgender and heterosexual partipants.

There was a significant relationship between the PSR partner's sexuality and the participant's sexuality ($\chi 2$ (1) = 17.45, p < .001). Using a chi-squared odds ratio, the results demonstrated that the odds of a participant choosing a queer PSR were 3.62 times higher if they were queer than if they were straight. Additionally, 12.7% of straight participants nominated an LGBTQ+ PSR partner, whereas 27% of LGBTQ+ participants nominated an LGBTQ+ PSR partner.

H4: LGBTQ+ participants who report greater perceived rejection (and minority stress) will report greater PSR intensity.

To test this hypothesis, levels of perceived rejection and minority stress were entered as predictors of PSR strength for the LGBTQ+ participants subsample (Table 5). An association between perceived rejection and PSR strength was not found (β = -.08, p > .05). Relatedly, an association between minority stress and PSR strength was not found for LGBTQ+ participants (β = .02, p > .05).

Table 5. H4: Perceived rejection and minority stress predicting PSR strength

Predictor	β	*SE*	*t*	*p*
Minority Stress	0.02	0.06	-1.05	0.30
Perceived Rejection	-0.08	0.05	-1.01	0.80

Outcome variable: PSR Strength

Table 6. H5: Relationship, friendship, and life satisfaction predicting PSR strength

Predictor	β	*SE*	*t*	*p*
Relationship Satisfaction	-0.01	0.03	-0.25	0.80
Friendship Satisfaction	-0.01	0.01	0.03	0.98
Life Satisfaction	0.00	0.01	0.03	0.90

Outcome variable: PSR Strength

H5: Real-life relationship satisfaction, friendship satisfaction, and life satisfaction will be negatively associated with PSR strength.

Real-life relationship satisfaction, friendship satisfaction,

and life satisfaction were entered simultaneously as predictors of PSR strength. Individuals' scores of relationship satisfaction (β = -.01, p > .01), friendship satisfaction (β = -.01, p > .01), and life satisfaction (β = .08, p > .01) were not significantly associated with greater PSR strength.

H6: Perceived PSR responsiveness will be positively associated with PSR strength.

When perceived partner responsiveness was tested as a predictor of PSR strength, greater reports of perceived PSR partner responsiveness (β = .43, p < .001) was significantly correlated with greater PSR strength (Table 7).

Table 7. H6: Perceived PSR responsiveness predicting PSR strength

Predictor	β	*SE*	*t*	*p*
Perceived PSR Responsiveness	0.43***	0.02	9.23	<.001

Outcome variable: PSR Strength

Study 2

An abundance of research examining social support points to its buffering effect on LGBTQ+ individuals, particularly within the context of minority stress experiences and related stressful events. LGBTQ+ individuals are at greater risk for a variety of detrimental outcomes and experiences in comparison to their straight counterparts (Bond, 2011; Diamond & Lucas, 2004; Meyer, 2003). Social support has been established as a critical buffer against negative psychological outcomes such as loneliness, hopelessness, depression, etc. (McConnell et al., 2015; Puckett et al., 2015; Wilkerson et al., 2017). Social support also promotes positive well-being outcomes such as increased self-esteem and improved coping with future stressors (Wilkerson et al., 2017; Wong et al., 2014). As such, this study was centered around how the social connections facilitated by PSRs might improve coping following a stressor. Specifically, the goal of Study 2 was to investigate whether engagement with one's PSR partner following a stressful event produced a buffering effect similar to that of receiving social support. To determine causality, an experimental design was employed.

Methods

Sample

The sample consisted of 182 individuals who self-identify as LGBTQ+ between the ages of 18 and 30 years old who spoke English as their primary language. This number was narrowed down to 170 participants after 12 surveys were excluded from the final analyses. Surveys were excluded if the participants did not complete the rejection task or stated they have never experienced such an event in their lives. This specific sample was chosen because it encompasses, as of Spring 2023, a range of adults that would have grown up spending a significant amount of time engaging with media and the internet, giving ample opportunity to form parasocial relationships with media figures. Survey data was collected from the University of Rochester campus (N = 2), the University of Rochester SONA pool (N = 17), Research Match N = 52), and Prolific (N = 99). Participants gathered from flyers distributed on the University of Rochester campus were compensated with $5 Amazon gift-cards. SONA participants were awarded 1.0 SONA credits for their participation. Participation on Research Match was completely voluntary. Prolific participants were compensated with $5 via the Prolific system. Compensated participation was funded using the Barth-Crapsey Award.

The average age of participants was 23.97 years old (SD = 3.47), and their PSR partners averaged 31.63 years old (SD = 11.00). Of the 170 participants recruited, 70.6% were White, 10.6% were Asian, 10.6% were Black or African American, 1.8% were Native American or Alaska Native, and the remaining 5.8% identified with other racial identities. Additionally, 5.9% of participants identified as Latino/a/x, 5.3% as Hispanic, and 1.8% as Spanish. This sample included a wide range of gender identities with 51.2% of participants identifying as women, 22.4% as men, 11.2% as non-binary, .6% as genderqueer, .6% as gender non-conforming, 1.8% as genderfluid, 4.7% as trans men, 1.2% as trans women, and 2.9% remainder as questioning. Given the research question's focus on LGBTQ+ individuals, this sample consisted of participants across the sexuality spectrum, with 7.6% identifying as gay, 10% as lesbian, 50.6% as bisexual, 7.1% as asexual, 11.2% as queer, 2.4% as questioning, and 6.5% identifying as a gender not listed.

Survey Measures

The study began by asking participants to enter the name of their favorite figure into a textbox. Next, participants were given the following prompt:

"[The following section asks about your favorite media figure. This person can be a celebrity, singer/songwriter, internet influencer, fictional character, etc., and should be someone you feel an emotional connection with and whose content you interact with often.]"

The "Stressful Event." For the purposes of this project, the "stressful event" was created by having participants reflect on a past negative incident in which they felt rejected due to their LGBTQ+ identity (e.g., "Please describe an instance in your life where you felt rejected, excluded, or isolated due to your LGBTQ+ identity.") across three survey items. This design was created to evoke some of the negative emotions associated with the perceived rejection event. Afterwards, participants were randomly assigned to one of two conditions. In the experimental condition, participants were given the opportunity to discuss their previously identified PSR partner at length (e.g., "What, specifically, do you like about your favorite media figure?") across 4 survey items. In the control condition, they were simply asked to describe neutral topics (e.g., "What is your favorite meal? Why?") across 3 survey items. All questions were to be answered in 50–75 words.

Current Mood and Emotions. The participants were given the Scale of Positive and Negative Experience (SPANE, Diener et al., 2009) in order to measure their current positive and negative experiences following the experiment. Questions asked participants to rate the degree to which they felt a specific

emotion (e.g., distressed, excited, etc.) at that given moment. The SPANE contains twenty-one items that can be divided into two subscales, one for positive experience and one for negative experience. The Cronbach's alphas were .88 and .89 respectively. The Positive and Negative Affect Schedule (PANAS) was also used as a measure of the participant's current affect (Clark & Tellegen, 1988). The PANAS contains twelve items. Two subscales were computed, one for positive affect and one for negative affect. Cronbach's alphas were .92 and .89 respectively. Answers for both the SPANE and the PANAS were recorded using a 7-point Likert scale ranging from not at all to extremely.

Feelings of Comfort. To measure the degree to which participants feel comforted following their engagement with (or lack of engagement with) their PSR partner, statements about current feelings of comfort were generated (e.g., "I feel comforted."). The scale contained 6 items and answers were recorded using a 7-point Likert scale ranging from strongly disagree to strongly agree. Cronbach's alpha was .87.

PSR Strength. The strength of the participant's relationship with their PSR partner was measured using the Parasocial Relationship Scale (Rosaen & Dibble, 2008), which was modified to include a wide variety of media formats. The scale contained 13 items and answers were recorded using a 7-point Likert scale ranging from strongly disagree to strongly agree. Cronbach's alpha was .79.

Additional PSR Partner Information. Participants were then asked to provide answers to questions regarding the PSR partner themselves, including a question about the PSR partner's estimated age and whether or not the participant believed their PSR partner to be LGBTQ+, "queer-coded," or neither.

Demographics. The participant's age, race/ethnicity, sexual orientation, and gender identity were collected at the end of the survey.

Results

H7a: LGBTQ+ participants who engage with their parasocial partner after experiencing rejection will experience higher levels of positive emotions and comfort and lower levels of negative emotions compared to LGBTQ+ participants who do not engage with their parasocial partner.

To test whether participants' PSR buffered the effects of recalling a negative event related to their LGBTQ+ identity, participants were randomly assigned to either the experimental or control condition. A binary variable was created to represent participants' assigned condition, with participants in the experimental condition assigned to +1, and those in the control condition -1. In five multiple linear regressions, PSR strength, condition, and condition x PSR strength were entered as predictors, with positive affect, negative affect, positive experience, negative experience, and comfort as outcome variables (Table 10).

Mean differences between experimental and control conditions.

Table 10. Study 2 correlation matrix and descriptive statistics

Variables	*M*	*SD*	1	2	3	4	5
1. PSR Strength	5.54	0.75	--				
2. Positive Affect	4.33	1.30	0.12	--			
3. Negative Affect	2.37	1.21	-0.03	-0.67***	--		
4. Negative Experience	2.12	1.11	-0.04	-0.46***	0.79***	--	
5. Positive Experience	3.75	1.15	.16*	0.73***	-0.43**	-0.22**	--
6. Comfort	3.76	0.98	.19*	0.64***	-0.44	-0.26**	0.61**

Table 11.

Predictor	β	*SE*	*t*	*p*
PSR Strength	0.12	0.14	1.57	0.12
Condition	0.00	0.10	0.02	0.99
PSR Strength x Condition	0.05	0.14	0.60	0.55

Outcome variable: Positive Affect

Table 12.

Predictor	β	*SE*	*t*	*p*
PSR Strength	-0.03	*0.13*	-0.33	0.74
Condition	-0.02	0.10	-0.30	0.77
PSR Strength x Condition	0.01	0.13	0.18	0.86

Outcome variable: Negative Affect

Table 13.

Predictor	β	*SE*	*t*	*p*
PSR Strength	0.16*	0.12	2.07	0.04
Condition	-0.03	0.09	-0.41	0.68
PSR Strength x Condition	0.02	0.12	0.26	0.80

Outcome variable: Positive Experience

Table 14.

Predictor	β	*SE*	*t*	*p*
PSR Strength	-0.03	0.12	-0.32	0.75
Condition	-0.01	0.09	-0.17	0.86
PSR Strength x Condition	0.07	0.12	0.85	0.40

Outcome variable: Negative Experience

Table 15.

Predictor	β	*SE*	*t*	*p*
PSR Strength	0.20**	0.10	2.55	< .01
Condition	0.15*	0.07	2.05	< .05
PSR Strength x Condition	0.06	0.10	0.81	0.42

Outcome variable: Comfort

Of the variables of interests, there was a significant mean difference between the experimental and control conditions for comfort. Participants in the experimental condition reported significantly higher comfort levels (M = 3.92) than those in the control condition (M = 3.61). There were no significant mean differences between the experimental and control conditions for positive affect, negative affect, positive experience, and negative experience (Table 16).

Table 16. T-test results for mean differences between experimental and control condition

	Experimental Condition		Control Condition				
Variables	*M*	*SD*	*M*	*SD*	*MD*	*t*	*p*
1. PSR Strength	5.56	0.08	5.54	0.02	0.03	0.23	0.82
2. Positive Affect	4.33	0.69	4.33	0.00	0.01	0.05	0.96
3. Negative Affect	2.34	1.24	2.40	-0.06	-0.06	0.93	0.76
4. Negative Experience	2.11	1.14	2.14	-0.03	-0.03	0.99	0.86
5. Positive Experience	3.72	1.25	3.79	-0.07	-0.06	0.05	0.71
6. Comfort	3.92	0.95	3.61	0.31	0.31*	0.58	< .05

H7b: This effect (the impact of PSR engagement between conditions) will be moderated by PSR Strength.

There was no support for the hypothesis that PSR strength would moderate the relationship between condition and positive affect, negative affect, positive experience, negative experience, and comfort (Table 11 to 15). There was, however, a significant main effect for PSR strength and condition in predicting participant comfort (Table 15). PSR strength predicted greater comfort levels among participants ($\beta = .20$, $p < .01$). Moreover, participants instructed to describe why they liked their PSR partner (i.e., experimental condition) reported feeling more comforted ($\beta = .15$, $p < .05$).

Discussion

One of the key findings of Study 1 was evidence for a relationship between PSR strength and perceived partner responsiveness. This finding has interesting implications for both areas of research. Responsiveness is considered a cornerstone of close relationships. The perception of responsiveness from a real relationship partner comes, in part, from actual responsiveness provided by that partner. Additionally, reinterpretations of ambiguity—that are motivated by the desire to maintain close relationships—can also impact perceptions of responsiveness (Reis & Clark, 2013). However, PSR partners are, by definition, distant individuals with whom the PSR holder has no real contact, thus there is no opportunity for actual responsiveness. This suggests that the responsiveness perceived by PSR holders from their PSR partners is likely entirely imagined, and therefore affected by personal motivations and biases. Another important thing to note about this finding is that PSRs, by definition, are one-sided connections. And yet, in order to perceive responsiveness from a PSR partner, there would need to be at least some form of two-sided interaction, albeit, imagined. In this way, perceived responsiveness differs from other variables and traits that PSR holders perceive in their PSR partners in the literature.

Additionally, in Study 1, LGBTQ+ participants were three times more likely to name an LGBTQ+ or queer-coded PSR partner compared to their straight counterparts, replicating a similar finding from Bond et al. (2018). This indicates that LGBTQ+ identity does seem to play a role in determining PSR partners for LGBTQ+ people. Some of the PSR literature already indicates a relationship between shared identities and PSR strength, as individuals are more likely to nominate same-gender PSR partners than opposite-gender PSR partners (Bond et al., 2018; Tukachinsky et al. 2020). However, while there was a significant correlation found between loneliness and PSR strength generally, the moderation found by Bond et al. (2018) was not replicated in my study. Additionally, the results did not support predictions based on the findings of Bond et al. (2018) relating perceived rejection and minority stress to PSR strength among LGBTQ+ individuals. This means that Bond et al. (2018)'s prediction that loneliness would be most prevalent for PSR development among LGB adolescents was not replicated in LGBTQ+ adults. The key differentiating factor between the present study and Bond et al. (2018)'s study is the examination of adults rather than adolescents, and the role of identity formation may be playing a significant role here. In Bond et al. (2018), researchers found that LGB adolescents were likely to rely on LGB PSR partners as sources of social information (i.e., socialization agents) on relational topics such as social life, romantic relationships, and sex more often than their heterosexual peers. With age, identity formation becomes less prevalent, which may consequently decrease the significance of PSR partners who play a role in identity formation. This would explain, in part, the discrepancy between my study and the one conducted by Bond et al. (2018). Moreover, the current work was conducted five years after Bond et al. (2018)'s study. Given that exposure to media figures is continuously growing due to advances in social media, it is possible that these differences have had a more significant impact on PSRs than previously considered.

Study 2 sought to explore a causal link between PSR engagement and well-being. Specifically, we investigated whether PSRs could provide individuals with a form of social support following a stressful event in the same or a similar way to real relationship partners. The results provided partial support for these predictions—PSR engagement was largely unrelated with differences in positive and negative emotion and engagement. However, participants who discussed their PSR partner in the experimental condition reported higher feelings of comfort compared to those in the control condition. Positive experience also achieved significance when PSR strength was a moderator. Additionally, we found that participants used words strongly indicative of responsiveness (though responsiveness was not explicitly measured) and social support to describe PSR partners in the free-response portion of the experiment (e.g., the term "support" appeared twenty-eight times out of eighty-five responses collected for the experimental condition, while "comfort" appeared twenty-one times). These results provide some preliminary evidence for a positive impact on well-being via PSR engagement. While it is unlikely that a PSR partner could fulfill all needs a real-life relationship partner could, it is possible that vulnerable individuals can lean on a PSR partner for support and comfort following a negative experience in a similar way to leaning on a real relationship partner. For example, LGBTQ+ people may seek out queer PSR partners if they lack relationships with other LGBTQ+ people in real life. More broadly, an individual could turn to engagement with their PSR partner following a stressful event if their partner is unavailable in that moment to soothe and comfort them.

Taken together, the findings of both studies provide evidence for the Panksepp-Jakobson hypothesis rather than the substitution hypothesis here. It can be argued that individuals seek out responsive PSR partners for the same reasons they seek out responsive real-life partners. For queer people, in particular, who may feel misunderstood and are often actively harassed for their identities, perceiving support, understanding, and comfort from a PSR partner in times of crisis may help to buffer and regulate negative emotions and stress. There is also the added benefit of seeking out an LGBTQ+ PSR partner, specifically. Receiving support from and feeling connected to one's own community contributes greatly to the well-being of LGBTQ+ people, but not all LGBTQ+ people are afforded an LGBTQ+ community to form close bonds with (Wong et al., 2014). One way to feel connected is through online groups and queer PSRs. Altogether, these findings are indicative of a need for further exploration into how PSRs and our own identities are interconnected, how they are able to produce a sense of responsiveness despite being one-sided, and how they can impact individual well-being.

Limitations

First, the population used in Study 1 and 2 are adult populations as opposed to the adolescent population pooled in Bond et al. (2018). Because adolescence is a period of heightened social difficulties and identity formation, it is possible that PSRs play a more significant role in adolescents' lives. Second, in Study 2, because we did not pilot the rejection condition, we cannot know for certain that it had a negative effect on participant mood and emotions as predicted. As a result, it is possible that changes (and non-changes) in mood and emotion are only relative to baseline. Future studies should improve upon Study 2's experiment by piloting a rejection condition first to ensure that participant moods are indeed negatively affected. Additionally, Study 2's experiment lacked a third baseline condition in which participants discussed a real-life relationship partner for "social support." Coupled with the unnatural environment in which the experiment took place (online via survey), future studies should seek to have participants engage with PSR partners and a real-life partner in a more naturalistic way. For example, participants in the experimental condition should watch an episode of the show featuring their PSR partner or scroll through their social media page, while participants in the baseline condition should have a short phonecall with a real-life relationship partner.

Future Directions

As the ways in which human beings interact with mass media continues to evolve and change over time, the relevance of parasocial relationships and interactions will do so as well. Future research on PSRs should continue to evolve to meet these demands. One path of research that is sure to provide needed nuance and support for a tie between well-being and PSR engagement is through physiological and neuroimaging methods. These methods can provide non-self-report evidence for an impact on well-being. PSR engagement could be tested differently as well. In this study, participants wrote about their PSR partners. In real life, however, when a person chooses to engage with their PSR partner, they typically do so via their media of preference (e.g., the PSR partner's social media page, the film the PSR partner is from, etc.). Future studies should also try having participants engage with their PSR partners in more naturalistic ways (e.g., viewing the PSR partner's social media page) to provide results more reflective of normative PSR engagement.

Conclusions

Bond et al. (2018) proposed that the substitution hypothesis does not apply to the broad, general population. Rather, it is better applied within specific, vulnerable populations, such as LGBTQ+ individuals. While I was unable to find evidence for the relationship between loneliness and PSR strength moderated by LGBTQ+ identity in my first study, I did find that LGBTQ+ participants were significantly more likely to nominate an LGBTQ+ or queer-coded PSR partner. Additionally, in Study 2, participants who engaged with their PSR partner after writing about a time they were rejected because of their LGBTQ+ identity, reported greater feelings of comfort following the disclosure, providing preliminary evidence for an impact of PSR engagement on well-being. Another notable finding that came out of these studies is the prevalence of perceived responsiveness. Given that perceived responsiveness is the feeling of being cared for, understood by, and validated by a close other, it has been established as a cornerstone of close relationships. It is a combination of motivated perception and objective truth, inherently a dyadic relationship process. An individual must act, or be perceived to act, responsively to be viewed as responsive. Finding such a strong association between the perceived responsiveness of a PSR partner and PSR strength is noteworthy because PSRs are, by definition, one-sided. The PSR partner cannot and does not interact with the PSR holder. In spite of this, a relationship between responsiveness and PSR strength was found in Study 1 and—though it was not actively measured—was suggested by the findings of Study 2 with the frequent usage of words strongly indicative of responsiveness and social support to describe PSR partners.

References

Ashe, D., & McCutheon, L. (2001). Shyness, loneliness, and attitude toward celebrities. Current Research in Social Psychology. 6(9), 124—133.

Berndt, T. J. (1996). Transitions in friendship and friends' influence. In J. A. Graber, J. Brooks Gunn, & A. C. Petersen (Eds.), Transitions through Adolescence (pp. 57–84). Mahwah,NJ: Erlbaum.

Bond, B. (2018). Parasocial relationships with media personae: Why they matter and how they differ among heterosexual, lesbian, gay, and bisexual adolescents. Media Psychology,21(3), 457–485. https://doi.org/10.1080/15213269.2017.1416295"

Bond, B. J. (2011). Sexual alienation: A review of factors influencing the loneliness of gay, lesbian, and bisexual adolescents. In S. J. Bevinn (Ed.), Psychology of Loneliness (pp.123–135). Hauppauge, NY: Nova Science.

David, K., Myers, M., Perry, S., Gouse, V., & Stein, C. B. (2019). Examination of insecure attachment and the potential for parasocial parental attachment (PPA) to a favorite celebrity through attachment theory. North American Journal of Psychology. 21(2), 387—406.

Dhanda, R. K. (2009). Loneliness and parasocial interaction with media characters. (UMI No. 1502257). [Master's thesis, University of California Davis]. ProQuest Dissertations Publishing.

Diamond, L., & Lucas, S. (2004). Sexual-minority and heterosexual youths' peer relationships: Experiences, expectations, and implications for well-being. Journal of Research on Adolescence, 14, 313–340. https://doi.org/10.1111/j.15327795.2004.00077.x

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi D., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. Social Indicators Research, 97, 143—156. https://doi.org/10.1007/s11205-009-9493-y

Eyal, K., & Cohen, J. (2006). When good friends say goodbye: A parasocial breakup study. Journal of Broadcasting and Electronic Media, 50, 502–523. https://doi.org/10.1207/s15506878jobem5003_9

Fraley, R., Waller, N., & Brennan, K. (2000). An item-response theory analysis of self report measures of adult attachment. Journal of Personality and Social Psychology, 78, 350-365. https://doi.org/10.1037/0022-3514.78.2.350

Giles, D. C. (2002). Parasocial interaction: A review of the literature and a model for future research. Media Psychology, 4, 279–305. https://doi.org/10.1207/S1532785XMEP0403_04

Hill, R., & Pettit, J. (2012). Suicide ideation and sexual orientation in college students: The roles of perceived burdensomeness, thwarted belongingness, and perceived rejection due to sexual orientation. Suicide and Life-Threatening Behavior, 42(5), 567–579. https://doi.org/10.1111/j.1943-278X.2012.00113.x

Hoffner, C., & Bond, B. (2022). Parasocial relationships, social media, and well-being. Current Opinion in Psychology, 45, 101306, https://doi.org/10.1016/j.copsyc.2022.101306

Hoffner, C., & Buchanan, M. (2005). Young adults' wishful identification with television characters: The role of perceived similarity and character attributes. Media Psychology, 7, 325–351. https://doi.org/10.1207/S1532785XMEP0704_2

Howell, A. (2016). Self-affirmation theory and the science of well-being. Journal of Happiness Studies. 18, 293—311. https://doi.org/10.1007/s10902-016-9713-5

Leary, M., Kelly, K., Cottrell, C., & Schreindorfer, L. (2013). Construct validity of the need to belong scale: Mapping the nomological network. Journal of Personality Assessment, 95(6), 610–624. https://doi.org/10.1080/00223891.2013.819511

McConnell, E., Birkett, M., & Mustanski, B. (2015). Typologies of social support and 9 associations with mental health outcomes among LGBT youth. LGBT Health, 2(1), 55– 61. https://doi.org/10.1089/lgbt.2014.0051

Meyer, I. (2003). Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. Psychological Bulletin, 129, 674 697. https://doi.org/10.1037/0033-2909.129.5.674

Nelson, K., Fuller, J., Choi, I., & Lyubomirsky, S. (2014). Beyond self-protection: Self affirmation benefits hedonic and eudaimonic well-being. Personality and Social Psychology Bulletin. 40(8), 998—1011. https://doi.org/10.1177/0146167214533389

Pavot, W., & Diener, E. (2008). The satisfaction with life scale and the emerging construct of life satisfaction. The Journal of Positive Psychology, 3(2), 137–152. https://doi.org/10.1080/17439760701756946

Puckett, J., Woodward, E., Mereish, E., & Pantalone, D. (2015). Parental rejection following sexual orientation disclosure: Impact on internalized homophobia, social support, andmental health. LGBT Health. 2(3) 265—269. https://doi.org/10.1089/lgbt.2013.0024

Reis, H. T., Maniaci, M. R., Caprariello, P. A., Eastwick, P. W., & Finkel, E. J. (2011). Familiarity does indeed promote attraction in live interaction. Journal of Personality and Social Psychology, 101, 557-570. https://doi.org/10.1037/a0022885

Rosaen, S., & Dibble, J. (2008). Investigating the relationships among child's age, parasocial interactions, and the social realism of favorite television characters. Communication Research Reports, 25, 145–154. https://doi.org/10.1080/08824090802021806

Rosaen, S., & Dibble, J. (2016). Clarifying the role of attachment and social compensation on parasocial relationships with television characters. Communication Studies, 67, 147 162. https://doi.org/10.1080/10510974.2015.1121898

Rubin, R., & McHugh, M. (1987). Development of parasocial interaction relationships. Journal of Broadcasting & Electronic Media, 31, 279–292. https://doi.org/10.1080/08838158709386664

Rubin, A., Perse, E., & Powell, R. (1985). Loneliness, parasocial interaction, and local television news viewing.

Human Communication Research, 12, 155–180. https://doi.org/10.1111/j.1468-2958.1985.tb00071.x

Schiappa, E., Allen, M., & Gregg, P. (2007). Parasocial relationships and television: A meta analysis of the effects. In R. W. Preiss, B. M. Gayle, N. Burrell, M. Allen, & J. Bryant (Eds.), Mass media effects research: Advances through meta-analysis (pp. 301–314). New York, NY: Routledge.

Stever, G. (2017). Evolutionary theory and reactions to mass media: Understanding parasocial attachment. Psychology of Popular Media Culture, 6, 95–102. https://doi.org/10.1037/ppm0000116

Tian, Q., & Hoffner, C. (2010). Parasocial interaction with liked, neutral, and disliked characters on a popular TV series. Mass Communication and Society, 13, 250–269. https://doi.org/10.1080/15205430903296051

Tsay, M., & Bodine, B. (2012). Exploring parasocial interaction in college students as a multidimensional construct: Do personality, interpersonal need, and television motive predict their relationships with media characters? Psychology of Popular Media Culture, 1, 185–200. https://doi.org/10.1037/a0028120

Tukachinsky, R., Walter, N., & Saucier, C. (2020). Antecedents and effects of parasocial relationships: A meta-analysis. Journal of Communication, 70(6), 868–894. https://doi.org/10.1093/joc/jqaa034

Wang, Q., Fink, E., & Cai, D. (2008). Loneliness, gender, and parasocial interaction: A uses and gratifications approach. Communication Quarterly. 56(1), 87—109. https://doi.org/10.1080/01463370701839057

Watson, D., Clark, L., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scale. Journal of Personality and Social Psychology, 54(6), 1063—1070. https://doi.org/10.1037//0022-3514.54.6.1063

Wilkerson, M., Schick, V., Romijnders, K., Bauldry, J., & Butame, S. (2017). Social support, depression, self-esteem, and coping among LGBTQ adolescents participating in Hatch Youth. Health Promotion Practice, 18(3), 358–365. https://doi.org/10.1177/1524839916654461

Wong, C., Schrager, S., Holloway, I., Meyer, I., & Kipke, M. (2014). Minority stress experiences and psychological well-being: The impact of support from and connection to social networks within the Los Angeles house and ball communities. Prevention Science. 15, 44—55 https://doi.org/10.1007/s11121-012-0348-4

Nicole Brown Jennings, BS Psychology with Honors, University of Hawaii at Manoa

Nicole "Nikki" Jennings earned her B.S. in Psychology with honors from the University of Hawaii at Manoa. She was a D1 student-athlete in Cheerleading and Track and Field while conducting independent research with guidance from her Honor's mentors. Now a graduate student at Palo Alto University, she aims to become a licensed family and marriage therapist. Nicole's goal is to help couples build healthier and happier relationships through clinical practice. She aspires to advance couples therapy research, particularly for diverse partnerships with trauma, and advocates for equitable sex health and psychoeducation that fosters and maintains connection and intimacy.

Was there a particular experience that sparked your research interests?

There is something profoundly igniting about love and connection that drives my research. For something to feel so unique yet be so universal, the nature of love perpetually fascinates me. I believe that the different types of love shared between individuals are both beautiful and insufficiently explored. Experiences with love, both positive and negative, shape the essence of human nature. My personal encounters with both have sparked my interest in pursuing a deeper understanding.

Who has been the most influential person in your life?

I owe everything to my mother and father. Witnessing their true love and experiencing their unwavering love for me has inspired me to be better, work harder, and love more deeply every day. They have provided a nurturing space that has allowed me to grow and achieve anything without fear. My parents have always gone above and beyond for me, and I am grateful for having such strong figures in my life.

What is your greatest accomplishment?

My greatest accomplishment is maintaining my elite status as a student-athlete. I simultaneously became a world champion and graduated at the top of my high school class while balancing traveling between states for practice. Recruited to a D1 cheerleading program, I transitioned to Track and Field my senior year after becoming ill with complications from COVID my junior year. Competing as a sprinter, I broke into the University of Hawaii's Top 10 in four events, despite having no prior experience in the sport. I demonstrated the athletic capabilities of an underestimated sport while conducting honors research that is being published.

Where do you see yourself in 10 years?

In 10 years, I see myself having or being a part of a successful private practice that has a diverse group of therapists that are dedicated to improving the mental health of individuals and couples. I hope to participate in research that expands the current understanding of bonding chemicals and their relevance in a clinical setting. Further, I hope to make good choices and prioritize my love and passions every day.

Love-hacking: A rapid systematic review of intranasal oxytocin for couples therapy

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Author Note

This research was conducted by Nicole Jennings in partial fulfillment of the requirements for undergraduate honors recognition, mentored by Dr. Scott Sinnett and chaired by Dr. Jonas Vibell. We have no conflict of interest to disclose. Thank you to those who have shown me love: in the past, present, and future. Correspondence concerning this article should be addressed to Nicole Jennings. Email: nicolebjennings@gmail.com

The neuropeptide oxytocin, a biological modulator of love, collaborates with our social milieu to foster relationships that ensure survival. Administration of intranasal oxytocin (INOXT) has been shown to facilitate prosocial behaviors and is currently undergoing appraisal for enhancing relationship-specific attributes as a clinical intervention. Currently, couples therapy, when combined with pharmaceutical interventions like INOXT, holds potential for enhancing treatment efficacy by addressing the multifaceted aspects of relationship dynamics. A rapid systematic review synthesizes the effects of INOXT on relationship maintaining behaviors and unifies the methodologies previously used by researchers examining INOXT. After yielding 242 studies from online databases, 17 reports met inclusion criteria with heterosexual couples (n=1292) where INOXT was administered to one or both individuals. INOXT was found to have positive effects on behavioral (conflict, etc.), emotional (jealousy, etc.), and physiological (neural arousal, etc.) outcomes for healthy couples, with distinctions made for couples with hormonal contraceptives. However, the study populations may not be generalizable to the predicted clients seeking couples therapy. Future studies should focus on optimal dosage, longer-term and repeated administration, and concurrent therapy sessions.

Keywords: Couples Therapy, Hormone Therapy, Intranasal Oxytocin, Pair bonding, Rapid Systematic Review

Although it may seem contrary to fairytales, love is a motivation system—rather than an emotion—facilitated by chemicals that regulate behaviors and cognitions responsible for survival (Seshadri, 2016). From work observing Microtus ochrogaster, also known as the monogamous prairie vole, and brain imaging research, the brain regions associated with love and the pair bonding process have recently become better understood (Aragona & Wang, 2004; Fisher, 2002; Fisher et al., 2005). Oxytocin (OXT), the neuropeptide essential to pair bonding and social behavior, is recognized as one of the main contributing chemicals of love (Aragona & Wang, 2004; Fisher, 2004; Seshadri, 2016). The necessity of love, or at least the chemical expression of it, has been empirically supported to aid in evolutionary success (Fisher, 2011; Seshardi, 2016). Pair bonding is also an evolutionary advantageous psychological construct found in only 3% of monogamous avian and mammalian species (Fisher, 2011). Pair bonding is quantified by behavioral and physiological measures that last long enough to rear children through infancy in environments benefitting from mates splitting nesthold activities (Bales et al., 2021). In early gatherer-hunter societies, the typical time between births was around four years, suggesting the hormonal bond may dissipate according to this timeline (See Fisher, 2011). This reproductive strategy conflicts with the modern pursuit for "true love" and may explain the cross-cultural modal divorce peak that occurs most frequently among couples at the four year mark and with one child (Fisher, 1992; Fisher, 2011).

One of the strongest social bonds is between a birthing parent and their child. OXT is the main facilitator of the pair bonding process and is essential to maternal child rearing processes such as labor, lactation, and attachment formation (Debiec, 2007; Walter et al., 2021). During birth, OXT interacts with estrogen and prolactin in brain regions such as the hypothalamus and amygdala to regulate the bond between an infant and their birthing parent (Walter et al., 2021).

The maternal-infant bond is reinforced through breastfeeding and bonding behaviors, forming the infant's attachment style through neural rewiring not only towards their caregivers, but towards their future romantic partners as well, where OXT is produced in high quantities during sexual intimacy and orgasm (Cera et al., 2021; Feeney & Noller, 1990; Magon & Karla, 2011; Walter et al., 2021). In romantic relationships, OXT levels peak around 6 months and continue to fluctuate during the different relationship stages (Schneiderman et al., 2012). With such a strong attachment forming between a child and parent, many assumptions have been made about the same powerful chemical being responsible for forming and maintaining romantic relationships. Given the important role of OXT, the use of exogenous OXT has been studied in a variety of clinical settings such as childbirth and childrearing.

The primary use of exogenous OXT has been integrated into labor and delivery through intravenous administration to aid uterine contractions and stimulate labor, currently representing the only FDA-approved form of OXT (Osilla & Sharma, 2023). Other forms of OXT, such as intranasal administration, have gained significant clinical recognition despite lacking FDA approval (Osilla & Sharma, 2023). Intranasal oxytocin, or INOXT, exerts its effects by directly penetrating the brain or entering circulation through the blood-brain barrier after nasal spray administration (Quintana et al., 2021; Yao & Kendrick, 2022). OXT facilitates a crucial role in social cognition, which has recently found application in clinical settings through INOXT. INOXT is currently undergoing active clinical trials for conditions such as migraines, weight management, substance abuse, dementia, mental disorders, and more, with autism spectrum disorder (ASD) most recently growing in popularity (ClinicalTrials.gov, n.d.; Cochrane et al., 2012; Giovanna et al., 2020; Huang et al., 2021). INOXT research has received criticism for having methodological issues, but continues to gain support since its potential for modulating social behavior may be significant (Burton, 2021; Sikich et al., 2023). Currently, the intricate neurobiological mechanisms of OXT are considered the cause of many methodological issues observed in INOXT research, such as sexual dimorphisms and variations in the dose-response curve. These complexities lead to diverse methodological strategies that disrupt uniformity across the field (Quintana et al., 2021).

INOXT has demonstrated the capability to increase empathetic capabilities (Bartz et al., 2010; Hurlemann et al., 2010), enhance socially reinforced learning (Hurlemann et al., 2010), increase trust and cooperation (Declerck et al., 2010; Van IJzendoorn & Bakermans-Kranenburg, 2012) and more (See Marsh et al., 2020). Given these positive influences on prosocial behavior and the role of OXT in reinforcement, INOXT could be harnessed as a treatment tool in couples therapy, providing chemical reinforcement for positive attachment behaviors learned during sessions (Domjan, 2018; Hurlemann et al., 2010). By facilitating prosocial behaviors, INOXT could help couples be more empathetic and trusting, fostering healthier communication during therapy. However, the social salience hypothesis suggests that OXT's effects may vary based on the saliency of social context, necessitating further research into how past social contexts influence INOXT's outcomes for couples (Bartz et al., 2011; Shamay-Tsoory & Abu-Akel, 2016). Social disorders like borderline personality disorder demonstrate how context, like trauma or child abuse, can cause adverse effects like distrust because their previous social contexts elicit negative reactions to stimuli others with healthy attachments would find positive (Bartz et al., 2011; Ebert et al., 2013). The psychopathology of OXT makes narrowing down specifically affected pathways difficult, which may be mitigated by using INOXT with behavioral therapy (Bartz et al., 2011; Burton, 2021). Using INOXT alongside couples' behavioral therapy could assist in reframing previous social contexts and attachment styles by rewiring neural pathways responsible for social behavior modulation, underscoring the importance of understanding INOXT's effects on couples (Shamay-Tsoory & Abu-Akel, 2016).

Research on INOXT could reveal its potential for enhancing positive relationship behaviors and improving therapy efficacy by serving as a treatment option. Successful couples therapy is crucial for preventing divorce, which can result from unhealthy communication patterns addressed during counseling (Earp et al., 2012; McShall & Johnson, 2016). Given the short-term and long-term success of therapy with medication—as opposed to just therapy or no intervention—implementing neuroenhancements in therapy sessions may be beneficial for couples (Carr, 2018). As divorce rates exceed 50%, there is a growing need for more effective solutions in couples therapy, given the bidirectional relationship between relationship discord and psychopathology (Kennedey & Ruggles, 2014; McShall & Johnson, 2016). Divorce's severity is additionally amplified in cases involving children, who are vulnerable to physical and mental health changes that effective interventions could help prevent (see Juwariah et al., 2022; Savulescu & Sandberg, 2008). Advocates of integrating neuroenhancements into couples therapy believe it could help mitigate the severe consequences of divorce on individuals' finances, well-being, and mental health by improving the therapy's overall efficacy (Choi & Marks, 2008; Kosfeld et al., 2005; Lamanna et al., 2021; Sander et al., 2020; See Wudarczyk et al., 2013).

Couples experiencing reduced intimacy due to illness, sexual dysfunction, or other factors may face declining relationship satisfaction, potentially leading to cyclical dissatisfaction and even divorce (Cera et al., 2021; Crowe, 2018). The diminishing neurophysical pair bonding process post-offspring maturity has profound socioemotional implications, given rising divorce rates and associated societal impacts (Fisher, 1994; Fisher, 2011; Earp et al., 2015). If neuroenhancements like INOXT can enhance feelings of attachment, increase sexual desire and satisfaction, reduce conflict and domestic violence, and support relationship maintenance as suggested by researchers, then INOXT could significantly benefit marriage and family counseling (Earp et al., 2012; Earp et al., 2015; Earp et al., 2016; Savulescu & Sandberg, 2008; Wudarczyk et al., 2013).

INOXT has demonstrated the ability to influence prosocial behavior in individuals and this is to be evaluated within a romantic dyadic context in this review. All preliminary research that has explored the effects of INOXT in heterosexual couples will be synthesized using a rapid systematic review (RSR) guided by the Cochrane Handbook. The main purpose of this paper is to identify and compare the current methodologies, findings, future study suggestions, and reported positive and negative effects of INOXT on modulating relationship behaviors and reveal any possible clinical applications for the use of INOXT as a therapy intervention. As a secondary review statement, sex differences in the current findings will be identified and appraised.

Methods 2

Procedure

Before data extraction began, this review, the search terms, and PICO inclusion and exclusion criteria were registered with PROSPERO (CRD42023404318). Using the registered search terms, all English records published up until March 01, 2023, from three electronic databases (PubMed, PsychINFO, and Hawaii's OneSearch) were identified. Reports were screened by hand in a two-step process (title/abstract; full-text screening) by one reviewer against defined criteria from protocol. All identified reports meeting inclusion criteria were retrieved for full-text screening after duplicates were removed. Reference screening was conducted during full-text screening to yield additional reports missed from the search due to possible catalog errors. Studies with multiple reports were screened individually before being combined and authors were reached out to confirm participants were the same. Any studies showing reasons for exclusion during the data extraction were removed.

Inclusion and Exclusion Criteria

With limited research on intranasal oxytocin (INOXT) in a dyadic context, the criteria was designed to be as inclusive as possible while maintaining a scope focusing on romantic relationship maintaining behaviors. Included studies must evaluate the effects of INOXT on heterosexual couples where one or both individuals are given the intervention in comparison to a control. The included outcomes are categorized by the emotional, behavioral, or physiological impact on relationship quality in a positive, negative, or insignificant way. No restriction on study design was set, but meta-analysis and systematic reviews would be excluded. Studies that only measured participants' endogenous levels of OXT or administered other forms for OXT as the intervention were excluded. Studies where only one sex is examined were excluded unless under circumstances discussed momentarily. Any study where the participants were not romantically involved would be excluded.

Ambiguous studies were resolved through discussion with the research mentor. For example, during the screening of a study by Fischer-Shofty, Levkovitz, & Shamay-Tsoory (2013), the relationship between the female and male participants were unclear in the initial screening given the intimate nature of the measured outcomes. After discussion, the participants' relationships were determined to be non-romantic, and thus needed to be excluded. Many studies would use female and male subjects but would be excluded if the study was not clear about the relationship of the participants. The purpose of this review is to determine INOXT's influence on outcomes for partners in a romantic relationship, not just the effects of INOXT on a general female/male relationship. Ambiguity in studies that separated females and males across different reports were discussed to verify they met all inclusion criteria when combined. Preckel et al. (2014) and Scheele at al. (2012) or Scheele et al. (2013) and Scheele at al. (2016) are examples of studies that were officially included after discussion determined both studies evaluated the same outcomes for females and males in romantic relationships even though the reports were separated. Studies including single participants had all single participant data excluded from analysis (Preckel et al., 2014; Scheele at al., 2012).

Data Extraction

The following data was extracted during full-text screening: DOI, article ID, title, study design, OXT information (dosage, puffs per nostril, duration, frequency/schedule), participant data (number, age, duration of relationship, inclusion and exclusion criteria, population sample), primary outcome(s) of the study and respective measuring tools, study hypothesis, methods, cited reasons for outcome affecting relationship quality, main findings, study suggestion, study limitations, sex differences, recommendations for clinical application, and preliminary synthesis notes as needed. Full data extraction can be requested by contacting the author. Different from the original protocol, preliminary data on female participants' hormonal birth control (HBC) methods and phases of the menstrual cycle during experimenting were additionally extracted following the primary extraction. For clarification, the original protocol was followed for all included studies and a secondary data extraction including HBC methods was performed. All studies were re-screened by hand for HBC data after being determined to be extremely relevant during the analysis stage of the data collected from the original protocol.

Participants

The review synthesized research outcomes on human participants into heterosexual, cis gender, romantic relationships. Participants had to be adults over the age of 18. Some studies report specific relationship characterizes that were collected and synthesized as available. For example, relationship duration, relationship satisfaction, parental status, and hormonal birth control status were participant factors to consider. Participants with specific diagnostic criteria would be included and adapted into a sub-group analysis. Having minimal restrictions on study populations was important for examining gaps of literature and generalizability of results.

Materials

A JBI scoping review was done before determining the appropriateness of conducting a rapid systematic review (Amog et al., 2022; Peters et al., 2020; Tricco et al., 2015). To ensure that the current RSR maintains the reliability and validity of a traditional systematic review with only one researcher, the Cochrane Handbook (2022) and MECIR Standards were used in conjunction with the Cochrane Rapid Review Handbook (2020) (Higgins et al., 2022). A PRISMA-S checklist was completed to ensure all necessary guidelines were followed in the reporting of the RSR protocol (Shamseer et al., 2015). After full-text screening, eligible articles were imported into an excel spreadsheet based on the Cochrane Systematic Review Template. The data was generally qualitative with a wide variety of methodologies and outcomes; thus, no meta-analysis or quantitative comparisons could be conducted. After a PICO(M) summary of findings (SOF) table was completed, studies were synthesized thematically with textual descriptions (Popay et al., 2006). As recommended for qualitative reviews, a critical reflection was used to assess the robustness of the review (Popay et al., 2006).

The purpose of a RSR is to maintain research integrity while omitting or streamlining necessary steps due to a lack of resources (Lasserton et al., 2022). Typical in an RSR, the current review did not produce a formal risk of bias assessment or GRADE quality assessment; however, factors such as experiment design are assessed in the discussion. To mitigate bias from a solo researcher: a clearly defined protocol was published and followed, data was extracted twice and compared by researcher and mentor to screen for inconsistencies, data extraction was verified by a research mentor before analysis began, and all original records have been maintained with original notes and dates.

Results

Overview of Included Studies

The search yielded 242 records from databases and an additional 18 from citation searching. Study locations include Germany, Switzerland, the United States, and China. After screening, 41 reports were assessed, leaving 17 reports and 13 eligible studies (Figure 1). All the included studies totaled 1292 adults (n=1292) above the age of 18 to 65 or 20 to 45 years of age. The average participant age was 27.2±3.0 with the average relationship duration of 3.6 years. No homosexual couples or varying sexual identities were included in any study, but one study did have two same sex couples that had their data excluded in all reports to avoid variance (Flanagan et al. 2018; Solomon et al. 2018; Leone et al. 2020).

11 of 13 studies designated healthy couples as their population, defined as couples in a monogamous heterosexual relationship for at least six months, without any diagnosis of psychiatric or mental health disorder, medication use, and specified relationship-related issues. Two studies observed couples with one or both partners suffering from substance abuse or diagnosed alcohol use disorder (Flanagan et al., 2022; Solomon et al., 2018). One of the substance abuse reports included couples with reported infidelity (Leone et al., 2020). Flanagan (2018) had an additional subgroup of couples with a history of intimate partner violence (IPV). Eight studies considered birth control status with four of those having both hormonal and nonhormonal birth control subgroups. Females were tested during the luteal phase in four studies, the follicular phase in three studies, and one study tested during either phase. Intranasal oxytocin (INOXT) scheduling, dosages, participant information, and birth control status were tabulated in Table 1. All the studies were randomly controlled trials, 11 being single dose administration and the remaining two were repeat administration for five days. Four studies had two sessions to test both drug conditions. 12 out of 13 studies were double blinded against bias, and the remaining one only blinded the participants from their treatment intervention. Kreuder et al. (2017, 2018) could not blind the experimenter to the stranger versus partner condition, but the other conditions were double-blinded. Two studies paired INOXT with a therapy tool, like the partner appreciation task (PAT), which garnered more significant results (Doerr et al., 2022; Ditzen et al., 2023).

Overview of Outcomes

In total, 22 behavioral, emotional, or physiological positive outcomes and 5 negative outcomes were identified with their reported sex differences in Table 2. In brief, sexual functioning, conflict behavior, approach behavior, partner and stranger attraction, partner and stranger touch, pain perception, positive interactions, sleep quality, jealousy, emotional arousal, neural activity, cortisol levels, immune functioning, and more, were positive outcomes measured in a romantic dyadic context. Sex differences were found in sexual functioning parameters, conflict, approach behavior, attraction, interactions, sleep quality, jealousy, emotional arousal, immune factors, and in pain and touch regions. For the negative outcomes, INOXT caused less friendly behavior in groups without the therapy tool (Ditzen et al., 2022), more negative behavior in couples with a history of violence (Flanagan et al., 2018), fewer relationship-enhancing qualities in couples with a history of infidelity (Leone et al., 2020), nosebleeds (Flanagan et al., 2022), and other physical symptoms (Kreuder et al., 2018).

The main takeaways from the reviewed studies on intranasal oxytocin (INOXT) in heterosexual couples include positive effects on aspects of sexual functioning (Behnia et al., 2014), improved behavior during conflict situations with decreased physical stress after conflict (Ditzen et al., 2009), and increased positive behaviors for couples with low dyadic coping skills (Zietlow et al., 2020). INOXT also showed improvements in sleep quality and immune functioning under certain conditions which were enhanced when the conditions implemented

a therapy tool (Doerr et al., 2022; Ditzen et al., 2023). INOXT increased the physiological value of partner touch and decreased pain perception with partner support in correlation to love scores (Kreuder et al., 2017; Kreuder et al., 2018). Jealousy ratings and arousal were significantly reduced with slight sex differences (Zheng et al., 2021). Approach behavior and attractiveness ratings towards strangers were influenced with recognizable sex differences (Preckel et al., 2014; Scheele et al., 2012). Attractiveness ratings towards partners were significantly increased for males, but only for females that had non-hormonal birth control (Scheele et al., 2013; Scheele et al., 2016). Behnia et al. (2014) also recognized diminished effects in females with hormonal birth control, while Doerr et al. (2022) did not find any difference. Adverse effects were observed in couples with a history of intimate partner violence or infidelity, especially females (Flanagan et al., 2018; Leone et al., 2020; Solomon et al., 2018).

In addition to main takeaways, Table 2 discusses the main recommendations for future INOXT research. To highlight, eleven authors recognize INOXT as a possible clinical treatment option for couples (Ditzen et al., 2009; Ditzen et al., 2012; Zietlow et al., 2019; Doerr et al., 2022; Kreuder et al., 2018; Flanagan et al., 2018; Leone et al., 2020) or other various disorders (Behnia et al., 2014; Ditzen et al., 2009; Doerr et al., 2022; Preckel et al., 2014; Scheele et al., 2013; Solomon et al., 2018). Five authors indicated that longer trials or repetitive administration of INOXT are needed (Behnia et al., 2014; Ditzen et al., 2009; Flanagan et al., 2022; Scheele et al., 2013; Flanagan et al., 2018). Five authors requested for INOXT to be paired with some form of therapy guidance (Flanagan et al., 2022; Kreuder et al., 2017; Kreuder et al., 2018; Flanagan et al., 2018; Leone et al., 2020). Five authors specifically request investigation of the ideal candidates or context for INOXT to be investigated further (Leone et al., 2020; Flanagan et al., 2022; Preckel et al., 2014; Flanagan et al., 2018; Leone et al., 2020). Three authors request more research on specific mechanisms of OXT before clinical implementation of INOXT (Doerr et al., 2022; Scheele et al., 2013; Solomon et al., 2018). Three authors suggest inclusion of homosexual couples (Flanagan et al., 2022; Solomon et al., 2018, Zietlow et al., 2019). Two authors recognize specific modes of studying sex differences (Ditzen et al., 2009; Preckel et al., 2014).

Discussion

Main Results

This review adds to current literature by providing an overview of the relationship maintaining behaviors affected by intranasal oxytocin (INOXT) for heterosexual couples. The most relevant findings for couples therapy address the positive outcomes that can improve communication. INOXT enhances positive interactions, increases positive feelings, reduces stress levels during and after conflict, diminishes feelings of jealousy and arousal, and amplifies partner attraction and touch, demonstrating its potential as a therapeutic intervention for couples. Factors such as sleep quality, immune function, alcohol cravings, stranger interaction, and sexual functioning may be important as relationship maintaining behaviors but may lack relevancy as an in-session measure and may only be practical for long-term use of INOXT. The positive emotional, behavioral, and physiological outcomes for couples using INOXT demonstrate the potential benefits of INOXT as a therapy intervention; however, due to a lack of research with multiple dosages, more long-term research is needed. The evidence of therapy tools improving the effects of INOXT while adverse reactions for couples with maladaptive interpersonal patterns are amplified, suggest the salience hypothesis for OXT is relevant in the dyadic context. More research is necessary to determine the underlying mechanisms causing the apparent sex differences and effectiveness for females on hormonal birth control (HBC).

The Salience Hypothesis

Compared to the placebo or no therapy condition, the two longitudinal studies show the therapy-like conditions positively increase the effects of the INOXT. This demonstrates the need for long-term research, evidencing the salience hypothesis, and the use of INOXT as a conjunction to therapy (Ditzen et al., 2023; Doerr et al., 2022). The bidirectional relationship between psychopathology and relationship distress illustrates that couples may pursue therapy based on the interaction between any possible existing psychiatric disorders and relationship quality (McShall & Johnson, 2015). Therapy interventions like INOXT could increase the efficacy of couples therapy, but the negative outcomes of this report show the risk for couples that may have pre-existing psychopathologies. Flanagan et al. (2018) highlights the negative possibilities of INOXT, showing females who have greater reports of psychological intimate partner violence have an increase in distress maintaining attributions and decrease in positive prosocial behavior in comparison to placebo or to females with lower reports of intimate partner violence. Leone et al. (2020) reported higher ratings of emotional and physical infidelity led to fewer relationship maintaining attributions and more distress maintaining attributions after INOXT administration, demonstrating INOXT is not always a "prosocial" hormone as supported by the salience hypothesis (Shamay-Tsoory & Abu-Akel, 2016).

Studies using couples with histories of abuse or infidelity saw an adverse reaction in the INOXT condition, suggesting the negative implications of the salience hypothesis for OXT (Flanagan et al., 2018; Leone et al., 2020). Populations with borderline personality disorder have been previously identified as being at a higher risk for having an opposite trusting effect to INOXT, which could put individuals with trauma, attachment, or personality disorders at an increased chance of negative outcomes without proper implementation (Bartz et al., 2011; Ebert et al., 2013; Shamay-Tsoory & Abu-Akel, 2016). How INOXT interacts with attachment styles is extremely relevant to couples reaching out for therapy, as they may be

more likely to have unhealthy attachments or psychopathologies that are bringing them to therapy (McShall & Johnson, 2015). As recommended for patients with borderline personality disorder and ASD, combining INOXT with interventions like cognitive-behavioral therapy may be an effective method to facilitate the learning of new relational schemas and interpersonal skills through added chemical reinforcement (Bartz et al., 2011; Burton, 2021). This recommendation should now be researched for couples as findings from Ditzen et al. (2023) and Doerr et al. (2022) suggest a successful conjunction of therapy with INOXT outcomes. Kreuder et al. (2017; 2018) illustrate the salience hypothesis by showing a significant correlation between reported love scores and the effects of INOXT. This suggests that the theoretical application of INOXT would be most effective when couples already have higher love scores, which may not be suitable for therapeutic use if behavioral therapy fails to address underlying social contexts that predispose adverse effects.

Hormone and Sex Differences

INOXT has been used long-term for other disorders and was found to have minimal adverse effects, but no research has been done for couples (Cai et al., 2018). The lack of repeated INOXT administration could undermine the long-term potential of INOXT, leaving its effects during different menstrual phases unexplored (Ditzen et al., 2022; Kreuder et al., 2017; Scheele et al., 2012). Due to the varying baseline endogenous OXT levels during a menstrual cycle, future research should compare results between menstrual phases and INOXT effects (Melillo, 2021). Hormonal birth control can dampen or negate the effects of INOXT (Scheele et al., 2013; Scheele et al., 2016) or may not affect them at all when repeated administration occurs (Doerr et al., 2022). Other inconsistent or ineffective results may be attributed to sex differences in endogenous systems, improper dose or scheduling per individual, or general methodical issues identified across INOXT research (Rilling et al., 2014; Quintana et al., 2021).

Differences in sex-specific hormones may implicate Arginine Vasopressin (AVP), a neuropeptide like OXT, as having a more prominent role in pair bonding behavior (Rilling et al., 2014). Males produce AVP at higher rates than females, suggesting the known receptor density differences between females and males possibly implicate behavioral differences with the influx of INOXT administration (Debiec et al., 2007; Dumais et al., 2013; Rilling et al., 2013). Recently OXT was found to not be solely required for pair bonding to take place, suggesting AVP or other neural pathways may compensate or "cross-talk" (Song & Albers, 2018; Berendzen et al., 2023). Cross-talking refers to when OXT is exogenously administered and endogenously released OXT activates AVP receptors (Song & Albers, 2018). The behavioral effects of AVP receptors cross-talking OXT is unknown but may explain the inconsistency of sex differences in INOXT research (Gao et al., 2016; Lu & Hu, 2021; Rilling et al., 2014). Since females and males have different endogenous systems, sex dependent dosages may be necessary. Understanding how INOXT reacts differently in same-sex couples could unlock more information about the interplay between sex hormones and the bonding pathways.

The administration dose of INOXT may vary per person due to factors such as sex, age, weight, trauma and more; these guidelines require rigorous development (Quintana et al., 2021). The studies rarely, if at all, recognized racial or ethnic variables despite the high likelihood that minority groups that have suffered from generational trauma and/or socioeconomic inequality may have neural pathways that react differently to INOXT (Carter, Gibbons, & Beach, 2021). The studies all being in different geographical locations with minimal information on participant demographics can contribute to the mixed findings since INOXT is dependent on social context. The endogenous system is complex and is counterbalanced by multiple chemical modulators, so the possible impact from a hormone therapy treatment like INOXT needs to be better understood to prevent imbalances or HPA dysfunction (Levy & Tasker, 2012). Finding a suitable uniform dosage for treatment is difficult due to the non-linearity of OXT dose-response, which explains the variation in dosages seen in Table 1 (Quintana et al., 2021). Before INOXT can be used as an adjunct to behavioral therapy, a method for determining a suitable dosage per individual is needed before properly dosing couples, while also considering replicability. A lack of protocol for couples can yield inconclusive results that will prevent an accurate assessment of the effectiveness of INOXT as a treatment.

Limitations

Typically, multiple reviewers are recommended to decrease the chance of bias, but this was not feasible due to lack of resources. To prevent bias, a protocol was developed before searches and data extraction were conducted; however, methodological choices were made during the synthesis process which may cause error. For example, after data extraction was conducted, the full study reports still required referencing while writing the report, indicating that the extracted data was not robust enough. When writing the report, alterations to the tables had to be made if information was incorrect or not specific enough. Additional discussion points such as the birth control method or menstrual cycle phases were added after protocol was published. No risk of bias or quantitative comparison tool was used in the data evaluation, limiting effectiveness of conclusion. As presumed, the included studies had varying outcomes and methodologies, so a quantitative assessment could not be conducted.

Physiological markers are difficult to draw conclusions on due to lack of understanding the interaction between behaviors and associated arousal levels like cortisol or sympathetic nervous system indicators (Ditzen et al., 2009). Due to lack of generalizability of study populations, conclusions may not be applicable to the current clientele seeking couples therapy for maladaptive patterns or affairs until a strategy is developed. No homosexual couples or varying sexual identities were investigated; authors suggest including these demographics

may benefit the high-risk population and determine possible sex-related endogenous differences (Flanagan et al., 2022; Zietlow et al., 2019). Most participants were healthy and free from disorders, with some studies having participants with high relationship satisfaction and socioeconomic status with no children (See Table 1); this demographic is not the likely population seeking therapy. (McShall & Johnson, 2015; Mid-America Nazarene University, 2017).

Implications for Future Research

While the current study suggests that INOXT may be a potential tool to improve couples therapy, the current research is lacking uniform methodologies, preferred dose treatments, and general understanding of underlying sex differences seen across general INOXT research (Burton, 2021; Quintana et al., 2021). To remedy these issues, future research should address dose preferences per individual, scheduling criteria, preferred subgroups for treatment, the effects of combining couples behavioral training, and the long-term usage effects of INOXT for couples with or without HBC. Future studies should consider clarifying if dyadic female/male data will be interpreted singularly or as a couple to clarify confusion in reporting findings. More research needs to consider the effect of one individual receiving INOXT while the other does not, versus both receiving the PLC or INOXT. When developing a research design for INOXT, researchers should pre-register research to reduce bias, include replication designs in larger samples, and publish studies with open data and including the null effects for accurate interpretation (Quintana et al., 2021). Future research should evaluate the effect size and quality of evidence for INOXT in couples therapy using a formal GRADE assessment. A meta-analysis should be performed for applicable outcomes, while also considering participant characteristics such as race, age, relationship duration, hormonal birth control, sexual orientation, and history of trauma. Future research should prioritize checklists for suitable candidate and method criteria for ethical INOXT therapy research.

Ethical Considerations

Theoretical success of INOXT ranges from being a chemical reinforcer for learned positive communication behaviors in therapy sessions to INOXT making love easier through establishing inauthentic neurobehavioral patterns resembling the early pair-bonding process through manipulation. The ethical concern of the latter insinuates love can be controlled and created—something that science should not ethically pursue. Ethical considerations should ensure research integrity and preserve the elusiveness of love without being pathologizing. The primary concern with using psychiatric medication in couples therapy is the uncertainty surrounding its long-term effects on the endogenous system. This uncertainty could potentially lead to behavioral and hormonal health issues or may contribute to the development of hostile social situations, which could be particularly dangerous for women and other minorities who are at higher risk for domestic violence. A major ethical concern is in abusive couples seeking therapy where one partner may feel forced to receive treatment and could experience harmful consequences from the salience effect of OXT, decreasing positive outcomes and hindering health.

Critics have identified main ethical, social, and legal general concerns of pathologizing love, such as, the risk of coercion from a partner, unknown consequences, exacerbating social inequalities for minority groups, access to safety and risk information, the impact on personal autonomy and identity, and the general fear of misuse from pharmaceutical companies or clinicians (Giubilini et al., 2015; Hauskeller et al., 2015; Nyholm et al., 2015; O'Reilley et al., 2015). The concept of using neuroenhancements in a romantic dyadic is emergent, which supplies the need for the current review. INOXT currently can be easily accessed through over the counter or online stores despite the unknown full extent of the risks, and this could lead to misuse without proper regulation. Steps to ensure informed consent, careful regulation, competency, transparency, and other general ethical criteria that can be uncovered through more experimentation must be actively pursued to alleviate these risks (Earp et al., 2012, 2015, 2016). Without further research on INOXT in a dyadic context, it is challenging to fully assess concerns, particularly with respect to multicultural and diverse populations that are underrepresented in the current literature.

Conclusion

The current rapid review was not produced with the intention of being used for practical application but instead as a stepping stone towards suggested research options for couples therapy. The review identified the general scope of outcomes and methodologies being used in dyadic INOXT research. Noting sex differences, INOXT can stimulate healthier sex functioning, positive conflict interaction, enhance sleep and immune functions, decrease pain perception, increase partner attraction, modulate infidelity prevention behavior, and potentially more. All of the aforementioned effects could increase the effectiveness of couples therapy. Future research should prioritize sexual inclusivity to advance understanding of neural pathways modulating social behavior and sexual dimorphisms, potentially implicating a greater role of Arginine Vasopressin.

INOXT should not be used by practitioners until more diverse research with higher quality evidence has been produced. Individuals in relationships seeking life-long sustainability may benefit from INOXT when a sudden onset of limiting factors (such as poor mental health, stress, hormonal changes, etc.) disrupt social bonds in the short-term. Healthy populations show promising communication enhancements, but INOXT may not be beneficial for individuals for couples

with trauma or social disorders until therapy interventions in conjunction with INOXT have been properly tested. Given the most-likely population seeking therapy may have a history of trauma or disorders, working with the salience effect of OXT and using INOXT as a chemical reinforcer to newly learned social behaviors in therapy may be optimal. Determining the extent of trauma's impact on INOXT administration and assessing whether therapy interventions can mitigate this risk will be valuable in evaluating INOXT's potential as a therapeutic supplement in the future, especially for minority populations with higher levels of trauma. To remain ethical, neuroenhancements like INOXT should not be used without regulating bodies in place to avoid pseudo-therapists from inflicting damage on clients looking for a 'quick fix'. Clients often seek therapy thinking they require help in one way when the reality determined by counselors or psychologists may differ. Clients may be unaware of the mental health journey required for their problem areas and professionals should be responsible for guiding clients through proper planning. Couples must be extensively informed of the behavioral, emotional, and physical risks of using hormone therapy with their partner. Researchers face challenges in discerning which relationships could benefit or suffer from INOXT, but prioritizing individual safety over effectiveness is crucial. Prerequisite steps should be taken to establish healthier communication and lifestyle patterns before introducing INOXT to reduce the chance of adverse effects, even in healthy populations. Researchers should be aware of abusive relationships and candidates that are more at risk for adverse effects while further criteria are being established. INOXT should never assume a replacement role to therapy and should be pursued with caution and impartiality.

References

Aguilar-Raab, C., Eckstein, M., Geracitano, S., Prevost, M., Gold, I., Heinrichs, M., Bilderbeck, A., Ehlert, U., & Ditzen, B. (2019). Oxytocin modulates the cognitive appraisal of the own and others close intimate relationships. Fron tiers in Neuroscience, 13, 714. https://doi.org/10.3389/ fnins.2019.00714

Amog, K., Pham, B., Courvoisier, M., Mak, M., Booth, A., God frey, C., & Brouwers, M. C. (2022). The web-based "Right Review" tool asks reviewers simple questions to suggest methods from 41 knowledge synthesis methods. Jour nal of Clinical Epidemiology. Advance online publi cation. https://doi.org/10.1016/j.jclinepi.2022.05.018

Aragona, B. J., & Wang, Z. (2004). The prairie vole (Microtus Ochrogaster): An animal model for behavioral neu roendocrine research on pair bonding. ILAR Journal, 45(1), 35–45. https://doi.org/10.1093/ilar.45.1.35

Bartz, J., Simeon, D., Hamilton, H., Kim, S., Crystal, S., Braun, A., Vicens, V., & Hollander, E. (2011). Oxytocin can hin der trust and cooperation in borderline personality disorder. Social Cognitive and Affective Neu roscience, 6(5), 556–563. https://doi.org/10.1093/scan/ nsq085

Bartz, J. A., Zaki, J., Bolger, N., Hollander, E., Ludwig, N. Kolevzon, A., & Ochsner, K. N. (2010). Oxytocin seletively improves empathic accuracy. Psychological Science, 21(10), 1426–1428.https://doi. org/10.1177/0956797610383439

Behnia, B., Heinrichs, M., Bergmann, W., Jung, S., Germann, J., Schedlowski, M., Hartmann, U., & Kruger, T. H. C. 2014). Differential effects of intranasal oxytocin on sex ual experiences and partner interactions in couples. Hormones and Behavior, 65(3), 308–318. https:// doi.org/10.1016/j.yhbeh.2014.01.009

Berendzen, K. M., Sharma, R., Mandujano, M. A., Wei, Y., Rog ers, F. D., Simmons, T. C., Seelke, A. M. H., Bond, J. M., Lar ios, R., Goodwin, N. L., Sherman, M., Parthasarthy, S., Espineda, I., Knoedler, J. R., Beery, A., Bales, K. L., Shah, N. M., & Manoli, D. S. (2023). Oxytocin receptor is not required for social attachment in prairie voles. Neu ron, 111(6), 787–796.e4. https://doi.org/10.1016/j. neuron.2022.12.011

Cera, N.,Vargas-Cáceres, S., Oliveira, C., Monteiro, J., Branco, D., Pignatelli, D., & Rebelo, S. (2021). How Relevant is the systemic oxytocin concentration for human sexual be havior? A systematic review. Sexual Medicine, 9(4), 100370. https://doi.org/10.1016/j.esxm.2021.100370

Choi, H., & Marks, N. F. (2008). Marital conflict, depressive Symptoms, and functional impairment. Journal of mar riage and the family, 70(2), 377–390. https://doi. org/10.1111/j.1741-3737.2008.00488.x

Cochran, D. M., Fallon, D., Hill, M., & Frazier, J. A.(2013). The role of oxytocin in psychiatric disorders: A re view of biological and therapeutic research find ings. Harvard review of Psychiatry, 21(5), 219-247. Retrieved from https://cme.lww.com/files/ TheRoleofOxytocininPsychiatricDisordersAReviewofBio logicalandTherapeuticResearchFind ings-1377795996767.pdf

Crowe, M. (2012). Couple relationship problems and sexual dysfunctions: Therapeutic guidelines. Advances in Psy chiatric Treatment, 18(2), 154-159. doi:10.1192/apt. bp.109.007443

Debiec, J. (2007). From affiliative behaviors to romantic feel ings: A role of nanopeptides. FEBS Letters, 581, 2580-2586. https://doi.org/10.1016/j.febslet.2007.03.095

Declerck, C. H., Boone, C., & Kiyonari, T. (2010). Oxytocin and cooperation under conditions of uncertainty: the mod ulating role of incentives and social information. Hor mones and Behavior, 57(3), 368–374.https://doi. org/10.1016/j.yhbeh.2010.01.006

Ditzen, B., Aguilar-Raab, C., Winter, F., Hernández, C., Schnei der, E., Bodenmann, G.,Heinrichs, M., Ehlert, U., & Läuchli, S. (2023). Effects of intranasal oxytocin and positive couple interaction on immune factors in skin wounds. Brain, Behavior, and Immunity, 107, 90–97.

https://doi.org/10.1016/j.bbi.2022.08.011
Ditzen, B., Nater, U. M., Schaer, M., Marca, R. L., Bodenmann, G., Ehlert, U., & Heinrichs, M. (2013). Sex-specific effects of intranasal oxytocin on autonomic nervous system and emotional responses to couple conflict. Social Cog nitive and Affective Neuroscience, 8(8), 897–902. https://doi-org.eres.library.manoa.hawaii.edu/10.1093/scan/nss083
Ditzen, B., Schaer, M., Gabriel, B., Bodenmann, G., Ehlert, U., & Heinrichs, M. (2009). Intranasal oxytocin increases positive communication and reduces cortisol levels during couple conflict. Biological Psychiatry, 65(9), 728–731. https://doi.org.eres.library.manoa.hawaii.edu/10.1016/j.biopsych.2008.10.011
Doerr, J. M., Klaus, K., Troxel, W., Nater, U. M., Bodenmann, G., Heinrichs, M., Ehlert, U., & Ditzen, B. (2022). The effect of intranasal oxytocin on the association between couple interaction and sleep: A placebo-controlled study. Psy chosomatic Medicine, 84(6), 727-737. https://doi.org/10.1097/PSY.0000000000001091
Domjan, M. (2018). The Essentials of Conditioning and Learning (4th ed.). American Psychological Association. https://doi.org/10.1037/0000057-000
Dumais, K. M., Bredewold, R., Mayer, T. E., & Veenema, A. H. (2013). Sex differences in oxytocin receptor binding in forebrain regions: correlations with social interest in brain region- and sex- specific ways. Hormones and be havior, 64(4), 693–701. https://doi.org/10.1016/j.yhbeh.2013.08.012
Earp, B. D., Sandberg, A., & Savulescu, J. (2012). Natural se lection, childrearing, and the ethics of marriage (and di vorce): Building a case for the neuroenhancement of human relationships. Philosophy & Technology, 25(4), 561-587. https://doi.org/10.1007/s13347-012-0081-8
Earp, B. D., Sandberg, A., & Savulescu, J. (2015). The medical ization of love. Cambridge Quarterly of Healthcare Eth ics, 24(3), 323-336. https://doi.org/10.1017 S0963180114000206
Earp, B. D., Sandberg, A., & Savulescu, J. (2016). The medical ization of love: Response to critics. Cambridge Quarterly of Healthcare Ethics, 25(4), 759-771. https://doi.org/10.1017/S0963180116000542
Earp, B. D., Wudarczyk, O. A., Sandberg, A., & Savulescu, J. (2013). If I could just stop loving you: Anti-love biotech nology and the ethics of a chemical breakup. The Amer ican Journal of Bioethics, 13(11), 3-17. https://doi.org/10.1080/15265161.2013.839752
Feeney, J. A., & Noller, P. (1990). Attachment style as a pre dictor of adult romantic relationships. Journal of Per sonality and Social Psychology, 58(2), 281–291. https://doi.org/10.1037/0022-3514.58.2.281
Fisher, H. (1994). The evolution of human mating: Implica tions for mental health. The Journal of NIH Research, 6(4), 59-64. Reprinted in Annual Editions: Physical An thropology, Spring 1995. Retrieved from https://helenfisher.com/downloads/articles/04natofrl.pdf Fisher, H. (2004). Why We Love: The Nature and Chemistry of Ro mantic Love (First edition).
Henry Holt and Company. Fisher, H. (2008). The brain in love [Video]. TED. https://www.ted.com/talks helen_fisher_the_brain_in_love
Fisher, H. (2011). Serial monogamy and clandestine adultery: Evolution and consequences of the dual human re productive strategy. In S. Craig Roberts (Ed.), Applied Evolutionary Psychology. Oxford University Press. doi: 10.1093/acprof:oso/9780199586073.003.0007.
Fisher, H. (2021). Helen fisher curriculum vitae. Helen Fisher. Retrieved from https://helenfisher.com/about/#resumes
Fisher, H. (2002). fMRI and the neural mechanisms of mate choice. Annals of the New York Academy of Sciences, 985(1), 1-12. https://doi.org/10.1111/j.1749-6632.2003.tb07179.x
Fisher, H., Aron, A., & Brown, L. L. (2005). Romantic love: An fMRI study of a neural mechanism for mate choice. The Journal of Comparative Neurology, 493(1), 58– 62. https://doi.org/10.1002/cne.20772
Flanagan, J. C., Fischer, M. S., Nietert, P. J., Back, S. E., Maria, M. M., Snead, A., & Brady, K. T. (2018). Effects of oxytocin on cortisol reactivity and conflict resolution behaviors among couples with substance misuse. Psychiatry re search, 260, 346–352. https://doi.org/10.1016/j.psychres.2017.12.003
Flanagan, J. C., Nietert, P. J., Sippel, L., Jarnecke, A. M., Kirby, C., Hogan, J. N., Massa, A. A., Brower, J., Back, S. E., & Par rott, D. (2022). A randomized controlled trial examining the effects of intranasal oxytocin on alcohol craving and intimate partner aggression among couples. Journal of Psychiatric Research, 152, 14–24. https://doi.org/10.1016/j.jpsychires.2022.06.011.
Gao, S., Becker, B., Luo, L., Geng, Y., Zhao, W., Yin, Y., Hu, J., Gao, Z., Gong, Q., Hurlemann, R., Yao, D., & Kendrick, K. M. (2016). Oxytocin, the peptide that bonds the sexes also divides them. Proceedings of the National Acad emy of Sciences of the United States of Amer ica, 113(27), 7650–7654. https://doi.org/10.1073/pnas.1602620113
Garritty, C., Gartlehner, G., Kamel, C., King, V. J., Nussbaum er-Streit, B., Stevens, A., Hamel, C., & Affengruber, L. (2020). Cochrane Rapid Reviews. Interim Guidance from the Cochrane Rapid Reviews Methods Group (March 2020 ed.). Retrieved from http://methods.cochrane.org/sites/methods.cochrane.org.rapidreviews/files/uploads/cochrane_rr_-_guidance-23mar2020-final.pdf
Giovanna, G., Damiani, S., Fusar-Poli, L., Rocchetti, M., Bron dino, N., de Cagna, F., Mori, A., & Politi, P. (2020). Intrana sal oxytocin as a potential therapeutic strategy in post traumatic stress disorder: A systematic review. Psycho neuroendocrinology, 115, 104605. https://doi.org/10.1016/j.psyneuen.2020.104605
Giubilini, A. (2015). Normality, therapy, and enhancement:

What should bioconservatives say about the medical ization of love? Cambridge Quarterly of Healthcare Ethics, 24(3),347- 354.
Hauskeller, M. (2015). Clipping the angel's wings: Why the medicalization of love may still be worrying. Cam bridge Quarterly of Healthcare Ethics, 24(3), 303-312.
Higgins, J. P. T., Lasserson, T., Chandler, J., Tovey, D., Thomas, J., Flemyng, E., & Churchill, R. (2022). Methodological Expectations of Cochrane Intervention Reviews. Co chrane.
Huang, Y., Huang, X., Ebstein, R. P., & Yu, R. (2021). Intranasal oxytocin in the treatment of autism spectrum disor ders: A multilevel meta-analysis. Neuroscience and biobehavioral reviews, 122, 18–27.https://doi. org/10.1016/j.neubiorev.2020.12.028
Hurlemann, R., Patin, A., Onur, O. A., Cohen, M. X., Baumgartner, T., Metzler, S., Dziobek, I., Gallinat, J., Wagner, M., Maier, W., & Kendrick, K. M. (2010). Oxyto cin enhances amygdala-dependent, socially reinforced learning and emotional empathy in humans. The Journal of neuroscience, 30(14), 4999–5007. https:// doi.org/10.1523/JNEUROSCI.5538-09.2010
Juwariah, H. (2022). The influence of religiosity and spiritu ality on the mental health of Muslims in Malaysia. Ma laysian Journal of Medicine and Health Sciences, 18(3), 51-60. https://doi.org/10.17576/ medicine-2022-1803-06
Kosfeld, M., Heinrichs, M., Zak, P. J., Fischbacher, U., & Fehr, E. (2005). Oxytocin increases trust in humans. Nature, 435(7042), 673–676. https://doi.org/10.1038/ nature03701
Kposowa, A. J. (2003). Divorce and suicide risk. Journal of Epidemiology & Community Health, 57, 993. https:// doi.org/10.1136/jech.57.12.993
Kreuder, A. K., Scheele, D., Wassermann, L., Wollseifer, M., Stoffel-Wagner, B., Lee, M. R., Hennig, J., Maier, W., & Hurlemann, R. (2017). How the brain codes intimacy: The neurobiological substrates of romantic touch. Hu man Brain Mapping, 38(9), 4525–4534. https://doi. org/10.1002/hbm.23679
Kreuder, A. K.., Wassermann, L., Wollseifer, M., Ditzen, B., Eckstein, M., Stoffel-Wagner, B., Hennig, J., Hurle mann, R., & Scheele, D. (2019). Oxytocin enhances the pain-relieving effects of social support in romantic c ouples. Human Brain Mapping, 40(1), 242–251. https:// doi.org/10.1002/hbm.24368
Lefebvre, C., Glanville, J., Briscoe, S., Featherstone, R., Little wood, A., Marshall, C., Metzendorf, M-I., Noel-Storr, A., Paynter, R., Rader, T., Thomas, J., & Wieland, LS. (2022). Chapter 4: Searching for and selecting studies. In JPT Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, MJ Page, & VA Welch (Eds.), Cochrane handbook for systematic reviews of interventions version 6.3 (updated February 2022). Cochrane. Available from www.training.cochrane.org/handbook.
Leone, R. M., Jarnecke, A. M., Back, S. E., Brady, K. T., & Flana gan, J. C. (2020). The moderating role of infidelity on the relation between oxytocin and conflict behaviors among substance misusing couples. Experimental and Clinical Psychopharmacology, 28(3), 251–257. https:// doi.org/10.1037/pha0000320
Levy, B. H., & Tasker, J. G. (2012). Synaptic regulation of the hypothalamic-pituitary-adrenalaxis and its modulation by glucocorticoids and stress. Frontiers in Cellular Neu roscience, 6, 24.https://doi.org/10.3389/ fncel.2012.00024
Lu, Q., & Hu, S. (2021). Sex differences of oxytocin and vaso pressin in social behaviors. Handbook of clinical neurol ogy, 180, 65–88. https://doi.org/10.1016/B978-0- 12-820107-7.00005-7
Magon, N., & Kalra, S. (2011). The orgasmic history of oxyto cin: Love, lust, and labor. Indian Journal of Endocrinol ogy and Metabolism, 15 Suppl 3(Suppl3), S156– S161. https://doi.org/10.4103/2230-8210.84851
Marsh, N., Marsh, A. A., Lee, M. R., & Hurlemann, R. (2020). Oxytocin and the neurobiology of pros cial behavior. Reviews, 27(6), 1-15. https://doi. org/10.1177/1073858420960111 Melillo, G. (2021). Dr David Yeomans Explains the Interplay of Estrogen, Oxy tocin in Menstrual-Related Migraine. The American Jour nal of Managed Care. Retrieved from https://www.ajmc. com/view/dr-david-yeomans-explains-the-interplay-of estrogen-oxytocin-in-menstrual-related-migraine
MidAmerica Nazarene University. (2017). The State of Mar riage Counseling [Infographic]. Retrieved from https:// infographicjournal.com/wpcontent/uploads/2017/11/ StateofMarriageCounseling.jpg
Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., & Stewart, LA. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) statement. System atic Review, 4(1), 1. doi: 10.1186/2046-4053-4- 1
Nyholt, S. (2015). The medicalization of love and narrow and broad conceptions of human well being. Cambridge Quarterly of Healthcare Ethics, 24(3), 337-346. https://doi.org/10.1017/S0963180114000644
OpenAI. (2023). ChatGPT (Mar 23 version) [Large language model] [Grammar Enhancer AI]. https://chat.openai. com/chat
O'Reilly, M. (2015). Two concerns about the medicalization of love. Cambridge Quarterly of Healthcare Ethics, 24(4), 490-492. https://doi.org/10.1017/S0963180115000158 Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., Britten, N., Roen, K., & Duffy, S. (2006). Guidance on the conduct of narrative synthesis in sys tematic reviews: A comparison of guidance-led narra tive synthesis versus meta-analysis. Journal of Public Health, 28(4), 467-472. https://doi.org/10.1093/pubmed/fdl044
Preckel, K., Scheele, D., Kendrick, K. M. et al. (2014). Oxytocin

facilitates social approach behavior in women. Frontiers in Behavioral Neuroscience, 8, 191. https://doi.org/10.3389/fnbeh.2014.00191

Quintana, D. S., Lischke, A., Grace, S., Scheele, D., & Ma, Y. (2021). Advances in the field of intranasal oxytocin re search: lessons learned and future directions for clinical research. Molecular Psychiatry, 26(1), 80-91. https://doi.org/10.1038/s41380-020-00864-7

Rilling J. K. (2013). The neural and hormonal bases of human parental care. Neuropsychologia, 51(4), 731–747. https://doi.org/10.1016/j.neuropsychologia.2012.12.017

Rilling, J. K., DeMarco, A. C., Hackett, P. D., Chen, X., Gautam, P., Stair, S., Haroon, E., Thompson, R., Ditzen, B., Patel, R., & Pagnoni, G. (2014). Sex differences in the neural and behavioral response to intranasal oxytocin and vaso pressin during human social interaction. Psychoneuro endocrinology, 39, 237–248. https://doi.org/10.1016/j.psyneuen.2013.09.022

Sander, J. B., Baumeister, H., & Ritterfeld, U. (2020). The im pact of divorce on mental and physical health: A sys tematic review and meta-analysis. Frontiers in Psychol ogy, 11, 578083. https://doi.org/10.3389/fpsyg.2020.578083

Scheele, D., Plota, J., Stoffel-Wagner, B. et al. (2015). Hor monal contraceptives suppress oxytocin-induced brain reward responses to the partner's face. Social Cognitive and Affective Neuroscience, 11(5), 767-774. https://doi.org/10.1093/scan/nsv156

Scheele, D., Striepens, N., Güntürkün, O. et al. (2012). Oxyto cin modulates social distance between males and fe males. The Journal of Neuroscience, 32(46), 16074-16079. https://doi.org/10.1523JNEUROSCI.2755-12.2012

Scheele, D., Wille, A., Kendrick, K. M. et al. (2013). Oxytocin enhances brain reward system responses in men view ing the face of their female partner. Proceedings of the National Academy of Sciences of the United States of America, 110(50), 20308-20313. https://doi.org/10.1073/pnas.1314190110

Schneiderman, I., Zagoory-Sharon, O., Leckman, J. F., & Feld man, R. (2012). Oxytocin during the initial stages of romantic attachment: relations to couples' interactive reciprocity. Psychoneuroendocrinology, 37(8), 1277–1285. https://doi.org/10.1016/j psyneuen.2011.12.021

Seshadri, K. G. (2016). The neuroendocrinology of love. In dian Journal of Endocrinology and Metabolism, 20(4), 558–563. https://doi.org/10.4103/2230-8210.183479

Shamay-Tsoory, S. G., & Abu-Akel, A. (2016). The social sa lience hypothesis of oxytocin. Biological Pschiatry, 79(3), 194–202. https://doi.org/10.1016/j.biopsych.2015.07.020

Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., & Stewart, L. (2015). PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P): elaboration and explanation. BMJ, 349. http://prisma-statement.org/documents/PRISMA-P-checklist.pdf

Solomon, D. T., Nietert, P. J., Calhoun, C., Smith, D. W., Back, S. E., Barden, E., Brady, K. T., & Flanagan, J. C. (2018). Ef fects of oxytocin on emotional and physiological responses to conflict in couples with substance misuse. Couple and Family Psychology: Research and Practice, 7(2), 91–102. https://doi.org/10.1037/cfp0000103

Song, Z., & Albers, H. E. (2018). Cross-talk among oxytocin and arginine-vasopressin receptors: Relevance for basic and clinical studies of the brain and periphery. Frontiers in neuroendocrinology, 51, 14–24. https://doi.org/10.1016/j.yfrne.2017.10.004

Tzabazis, A., Kori, S., Mechanic, J., Miller, J., Pascual, C., Manering, N., Carson, D., Klukinov, M., Spierings, E., Ja cobs, D., Cuellar, J., Frey, W. H., 2nd, Hanson, L., Angst, M., & Yeomans, D. C. (2017). Oxytocin and Migraine Headache. Headache, 57 Suppl 2, 64–75. https://doi.org/10.1111/head.13082

Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2012). A sniff of trust: Meta-analysis of the effects of in tranasal oxytocin administration on face recognition, trust to in-group, and trust to out-group. Psychoneuro endocrinology, 37(3), 438-443. https://doi.org/10.1016/j.psyneuen.2011.07.008

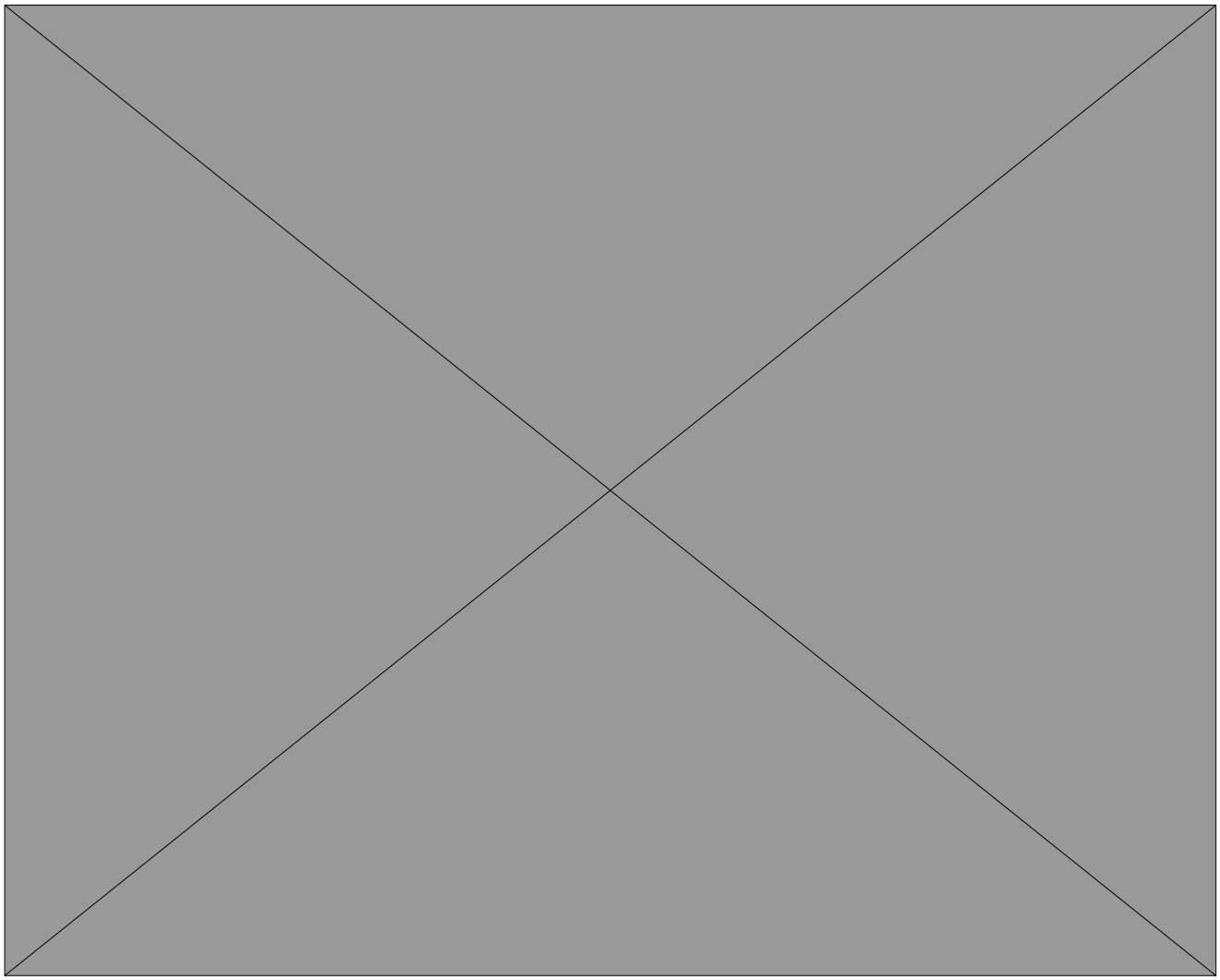
Walter, M. H., Abele, H., & Plappert, C. F. (2021). The role of oxytocin and the effect of stress during childbirth: Neu robiological basics and implications for mother and child. Frontiers in Endocrinology, 12, 742236. https://doi.org/10.3389/fendo.2021.742236

Wudarczyk, O. A., Earp, B. D., Guastella, A., & Savulescu, J. (2013). Could intranasal oxytocin be used to enhance relationships? Research imperatives, clinical policy, and ethical considerations. Current opinion in psychiatry, 26(5), 474–484. https://doi.org/10.1097/YCO.0b013e3283642e10

Zheng, X., & Kendrick, K. M. (2021). Neural and molecular contributions to pathological jealousy and a potential therapeutic role for intranasal oxytocin. Frontiers in Pharmacology, 12, 652473.https://doi.org/10.3389/fphar.2021.652473

Zietlow, A. L., Eckstein, M., Hernández, C., Nonnenmacher, N., Reck, C., Schaer, M., Bodenmann, G., Heinrichs, M., & Ditzen, B. (2019). Dyadic coping and its underlying neuroendocrine mechanisms - Implications for stress \ regulation. Frontiers in Psychology, 9, 2600. https://doi.org/10.3389/fpsyg.2018.02600.20

Table 1: *Summary of INOXT Administrations*



Note. Summarizes the INOXT dose, scheduling, and participant overview of the included studies. Abbreviations: HC- healthy couple; HBC- hormonal birth control; NHBC- nonhormonal birth control; NK- no kids; SA- substance abuse; IPV- intimate partner violence; NA- not applicable; NM- not mentioned in report; FP- follicular phase; LP- luteal phase.
*Author did not specify puff per nostril or puffs in general

Table 2: *Summary of Outcomes and Sex Differences*

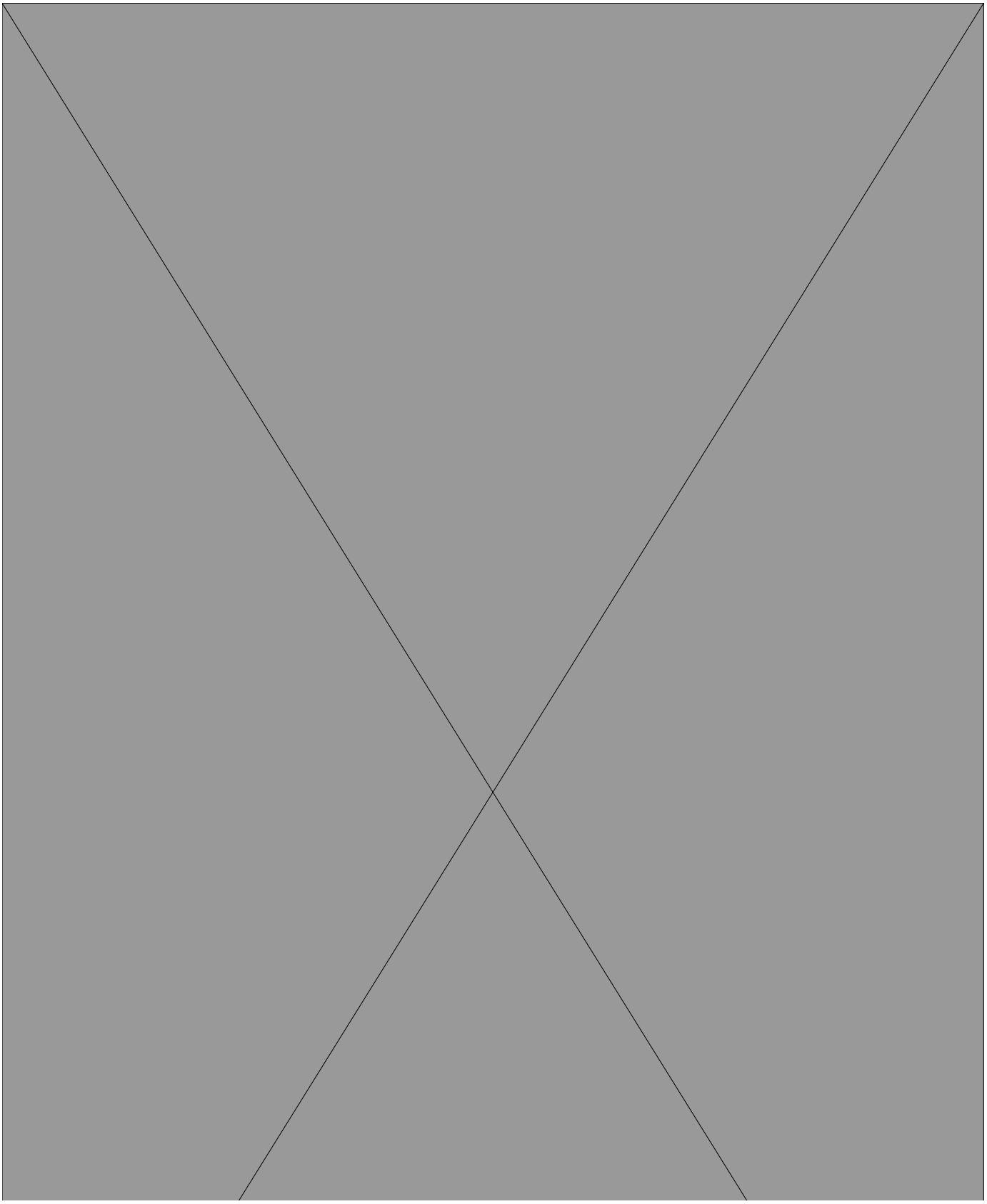
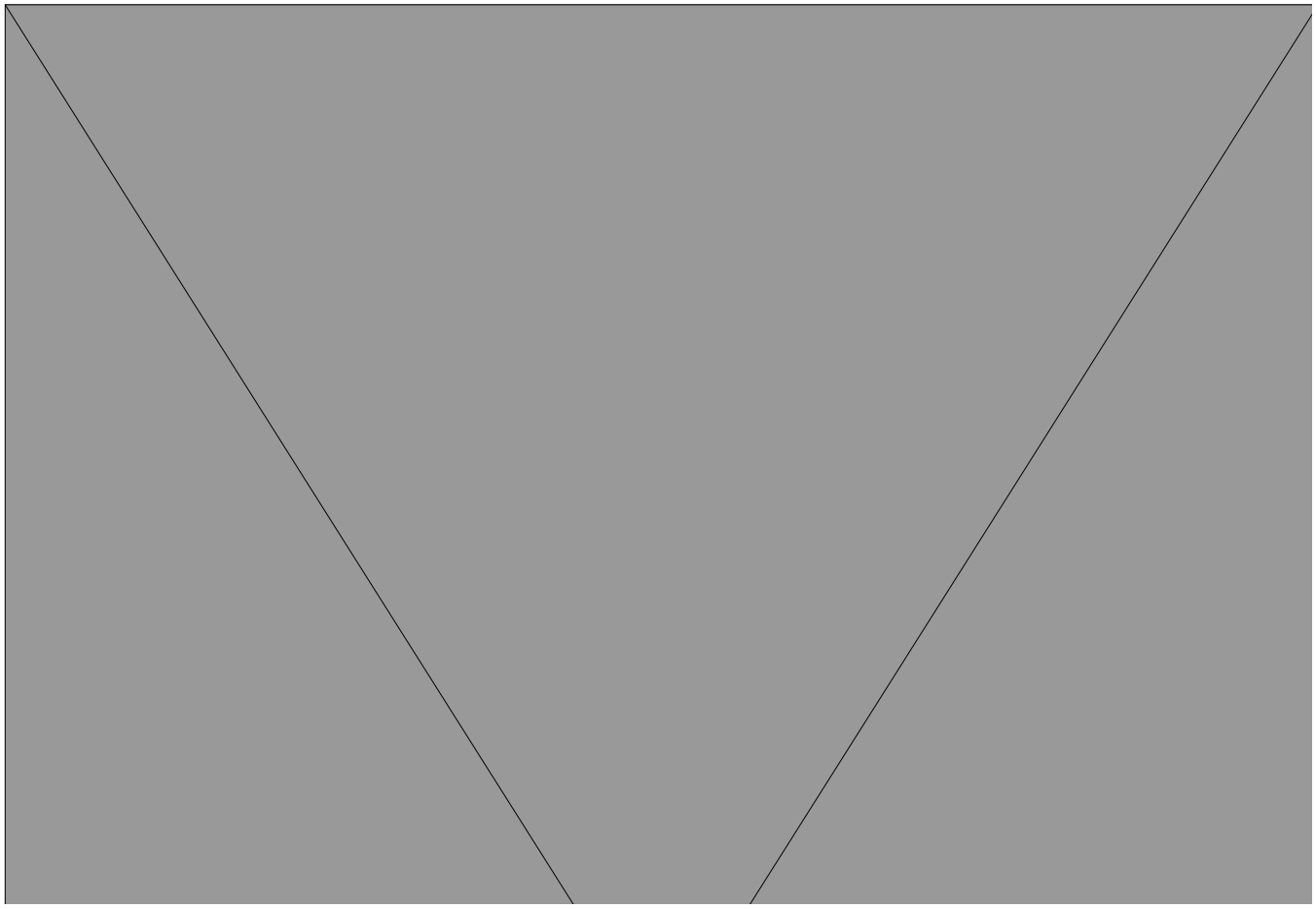
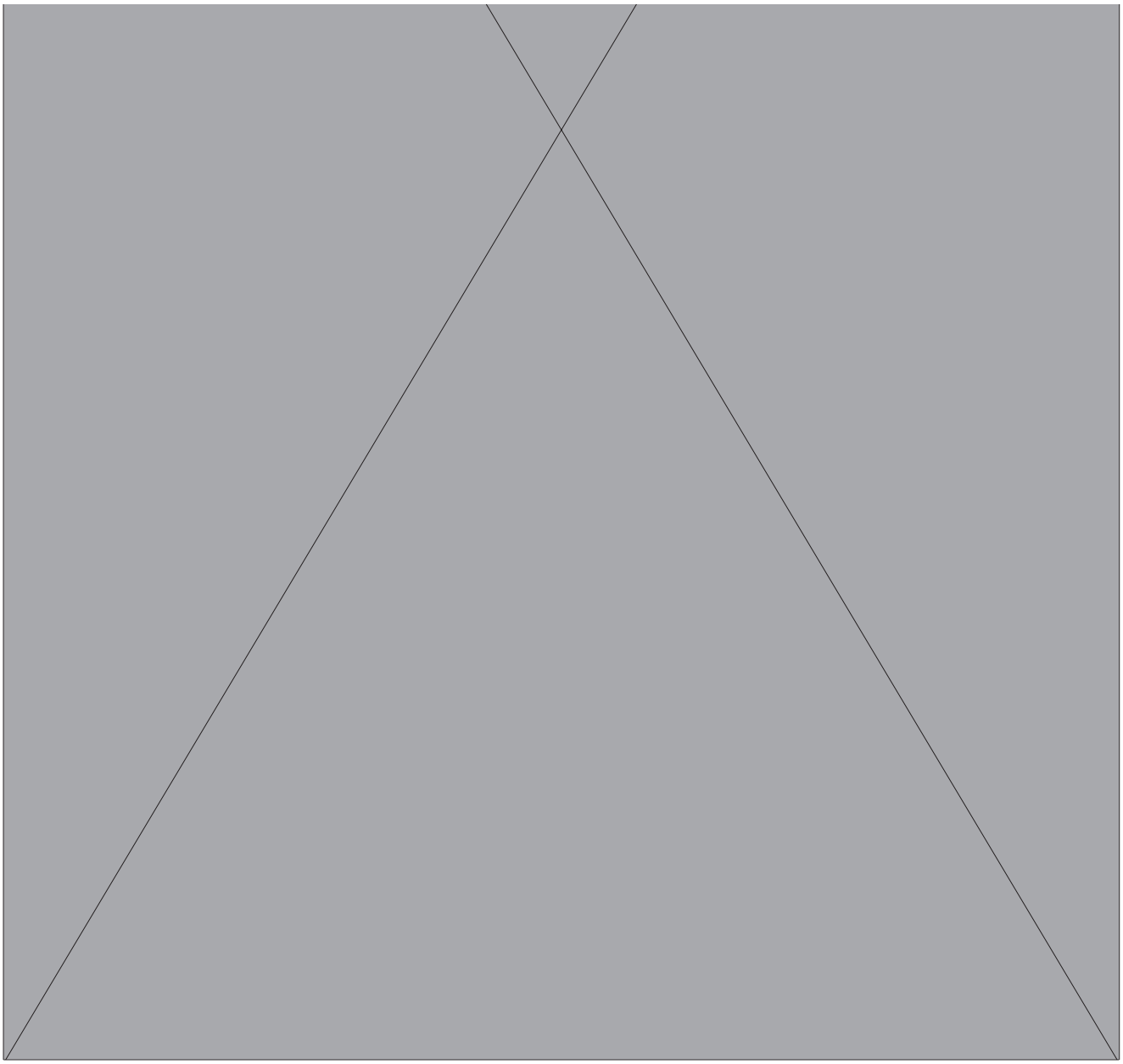


Table 2: *continued.*

Note. Summary of outcomes and adverse effects with sex differences from included studies. HBC- hormonal birth control; NHBC- nonhormonal birth control; SA- substance abuse.

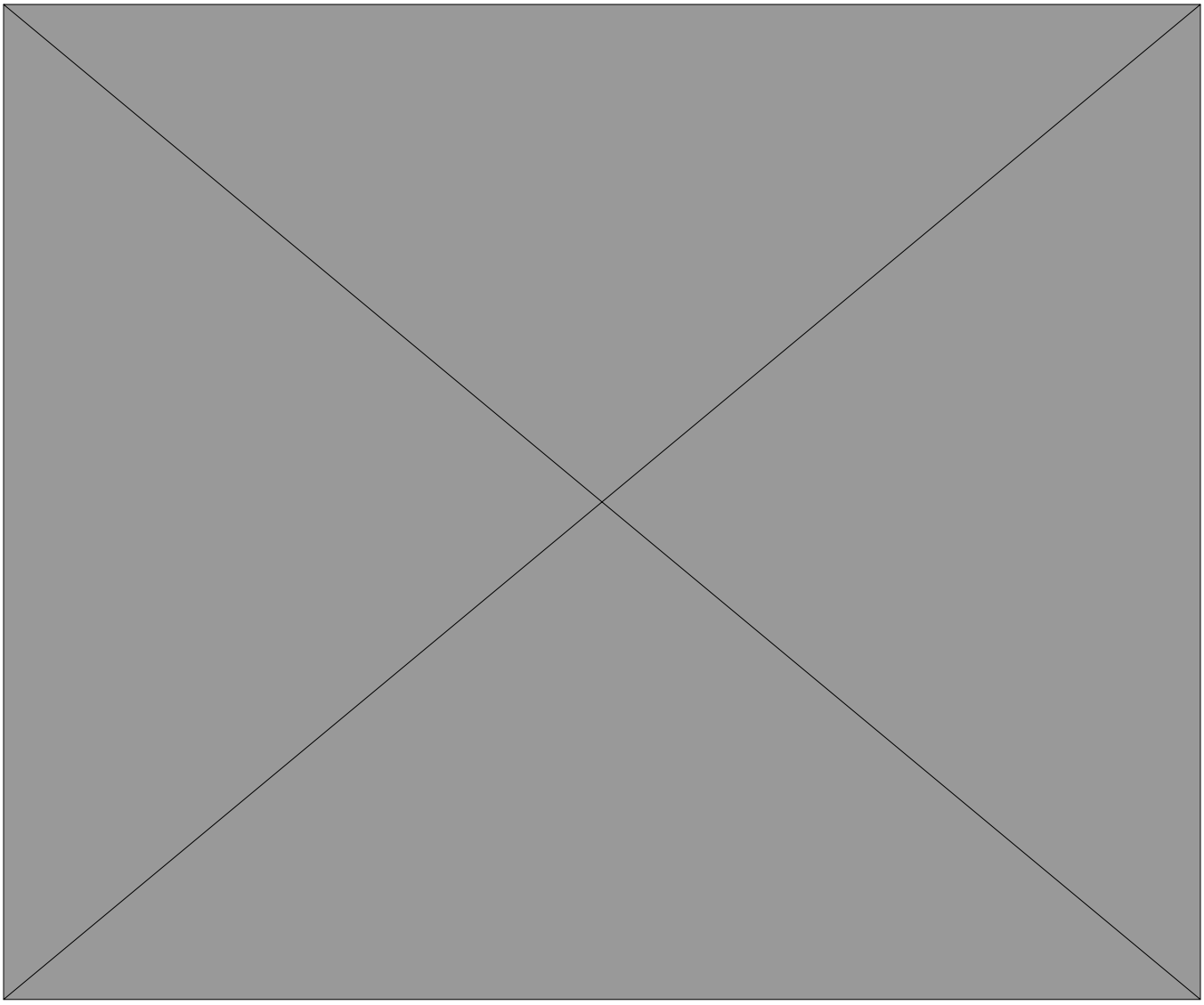
Table 3: *Summary of Findings Table*





Note. Summary of Findings table including main takeaways and author recommendations. Dark grey indicate reports from the same study.

Figure 1: *Prisma 2020 Workflow*



Note. PRISMA flow diagram detailing the process for final texts retrieved. *Two studies have three reports focusing on separate outcomes of the same study

Nabin Hyun, University of San Francisco B.A. in Honors Psychology

Nabin Hyun graduated from University of San Francisco with a Bachelor of Arts in Psychology in June 2022. As an undergraduate student, Nabin was a research assistant in Dr. Khan's Social Cognition and Judgement Lab as well as Dr. Cheung's Mass Emotion and Intergroup Conflict Lab. Under University of San Francisco's Honors in Psychology program led by Dr. Garrett-Walker and Dr. Levy, alongside a cohort of 9 other students, she completed the current research and paper on intergenerational dynamics and mental health outcomes. This research was presented at the 2022 Western Psychological Association and at University of San Francisco's Honors College Academic Showcase. Nabin is currently completing her Master of Arts in Clinical Mental Health Counseling at Northwestern University. She seeks to be a multiculturally sensitive and integrative counselor that explores the intersection between identities that shape one's person.

Was there a particular experience that sparked your research interests?

Intergenerational conflict, a phenomenon that may appear among bicultural individuals and multi-generational families, manifests as dissonance between a parent and a child due to contrasting values such as differing acculturation perspectives. Having grown up within the diverse backdrop of the Bay Area as the first and only second-generation immigrant of my family, I've witnessed firsthand how these dynamics play a large role in immigrant families as well as multi-generational households and communities. Through this research, I sought to deepen my understanding, investigate this phenomenon, and hone awareness about the impact of intergenerational dynamics on individuals across America.

Who has been the most influential person in your life?

When I think of influential people in my life, I think of the phrase "it takes a village to raise a person". There is not just a single person that comes to mind, but a collective of individuals including my family, friends, educators, and the communities I grew up with. All have deeply inspired and influenced me along my journey. In this current research endeavor, I received monumental support and guidance from my mentors at University of San Francisco. I would like to thank Dr. Garrett-Walker for her support during the cultivation and development of this project. I would like to express immense gratitude to my supervisor, Dr. Levy, who provided guidance from the step-by-step project development, administration process, all the way to the finalized piece. I would also like to bring recognition and appreciation toward Dr. Khan, Dr. Cheung, and Dr. Perez for providing me with inspiration, insight, and knowledge that helped me to successfully complete my thesis. Lastly, I'd like to thank my family and my friends for the loving support, motivation, and care they've shown me throughout this research endeavor.

What is your greatest accomplishment?

While I still have many aspirations for the future, my greatest accomplishment to date would be the completion of my B.A. and the finalization of my M.A. degree. I hope to use these degrees to serve and support my communities with culturally adaptive and inclusive mental health services, interventions, and research.

Where do you see yourslef in 10 years?

In 10 years, I would ideally love to have my own private practice that integrates and ensures a multiculturally sensitive and inclusive framework, offers diverse therapeutic techniques for healing, and provides affordable sliding scale options to increase accessibility to mental health services.

Intergenerational Conflict, Mental Health, and the Role of Perceived Social Support

Nabin Hyun

University of San Francisco

Intergenerational conflict, a prevalent phenomenon seen within child-parent dynamics, manifests in various contexts. Children from intergenerational families often encounter acculturation-enculturation specific conflicts, stemming from diverse areas such as responsibility for family welfare, autonomy, career and educational aspirations, dating and marriage expectations, and gender roles (Chung, 2001). These cultural dimensions of conflict explain the complex dynamics of intergenerational familial incongruence experienced by such children. How intergenerational conflict can impact aspects of mental health for adult children, requires further investigation. 195 participants were recruited through convenience sampling from the University of San Francisco and random sampling from Amazon Mechanical Turk. An independent samples t-test was conducted to examine the relationship of high and low intergenerational conflict ratings on (1a) mental well-being and (1b) psychological distress. A hierarchical multiple regression analysis on the moderating role of perceived social support on intergenerational conflict and (2a) psychological distress as well as (2b) mental well-being. Results indicated that high levels of intergenerational conflict was associated with lower mental well-being compared to those who indicated low intergenerational conflict. Moreover, those who reported high intergenerational conflict had higher psychological distress, than those who indicated low intergenerational conflict. Notably, perceived social support significantly moderated the relationship between intergenerational conflict and psychological distress. These findings illuminate the protective role of social support in mitigating adverse mental health effects, such as psychological distress and mental well-being, from familial conflict on adult children. Keywords: family conflict, intergenerational, mental health, psychological outcomes, perceived social support

Intergenerational Conflict, Mental Health, and the Role of Perceived Social Support

In the cultural mosaic of the United States, contrasting values of individualism and collectivism intersect, posing unique challenges for children from immigrant families. While the United States champions independence and autonomy, collectivistic-oriented countries like those in Asia, Latin America, the Middle East, Africa, and Europe prioritize values such as interdependency (Dennis et al., 2010). Immigrant children must navigate this cultural duality, negotiating their self-identity amidst divergent sets of values. However, the complexity intensifies when they confront the dilemma of prioritizing personal aspirations over familial expectations (Fuligni et al., 1999). As children assert their individual interests and goals, conflicts with collectivistic family ideals may ensue, underscoring the intricate interplay between cultural values and familial dynamics (Human et al., 2016). Clarke et al. (1999) outlined key conflicts between parents and adult children, including differences in habits, lifestyle, and communication. Dennis et al. (2010) emphasized the role of acculturation, family cohesion, and control in generating discord. These conflicts signify broader intergenerational discord with potential psychological repercussions. Research indicates that parent-child conflicts correlate with negative mental health outcomes such as depression, low self-esteem, and stress (Dennis et al., 2010; Human et al., 2016; Lee et al., 2004). Positive social support from family and friends can mitigate these effects (Khallad et al., 2016; Yang et al., 2013), prompting inquiry into whether perceived social support can buffer intergenerational conflict's impact on mental health (Kalibatseva et al., 2017; Su et al., 2005). Intergenerational conflict, driven by family expectations and differences in goals and values, is associated with anxiety and depression in young adults (Smokowski et al., 2013), affecting diverse populations, including Asian, Latinx, and Arab young adults (Chung et al., 2001; Dennis et al., 2010; Rasmi et al., 2015). Such bicultural individuals often experience conflict due to prioritizing family wishes over their own (Cepa & Kao, 2019; Fuligni et al., 2001). Immigrant young adults perceive familial obligations both as pressure and opportunity for gratitude (Urdan et al., 2007), facing high conflict levels due to dissonance and differences in values (Ma, 2005), leading to psychological strain 4 (Human et al., 2016; Lee et al., 2004). Research underscores social support's role in mitigating family conflict and psychological distress (Lee et al., 2005; Su et al., 2005; Yang et

al., 2013; Ginzburg et al., 2021). High social support correlates with reduced depression, anxiety, and stress symptoms (Alsubaie et al., 2019; Hefner et al., 2009; Vungkhanching et al., 2017), promoting mental well-being while buffering relational stressors, including familial conflict (Khallad et al., 2016).

The current research aims to explore such interaction between intergenerational parent-child conflict and its impact on mental health, examining how psychological distress and mental well-being are affected by greater and lower levels of family-child conflict interactions. Additionally, it investigates how protective factors like social support, may serve to mitigate the relationship between negative mental health outcomes and intergenerational conflict (Tang et al., 1999). Such that higher levels of social support may aid with alleviating adverse mental health outcomes.

The Dynamics that Contribbute to Intergenerational Conflict

In multicultural societies like America, children often develop their own values, identities, career aspirations, and educational interests, which may diverge from their parents' expectations, leading to intergenerational conflict (Hannum et al., 2004).

Intergenerational conflicts may take many different forms; one of these areas of conflict is differences over educational and career preferences (Hwang, 2006). Particularly, immigrant parents may discourage their children from pursuing less "practical" careers (e.g. art related) and emphasizing "realistic" careers (e.g. STEM or law related), which can again be a source of intergenerational conflict as this can evoke feelings of stress and resentment in being "assigned" a future (Lee et al., 2004).

Furthermore, as children become more assimilated into the dominant culture, they may prioritize individualistic preferences (Lee et al., 2004). Immigrant young adults often face a dilemma between their own desires and their family's expectations, particularly in career choices. For example, immigrant families commonly stress traditionally stable and prestigious occupations like business, STEM, or health professions, leading to conflicts particularly when adult children desire professions outside these familial career expectations, such as in the arts, must either prioritize family preferences or choose their personal interests (Poon, 2014; Kim, 1993; Ma, 2005). This emphasis by families on young adults to choose these traditional occupations can lead up to two dilemmas: disregard one's own vocational 5 career interests and go into the family desired career field(s) or face familial conflict with differentiating career values (Kim, 1993; Ma, 2005; Poon, 2014).

Another source of conflict is differences in marriage and dating values, particularly among second-generation immigrant children and their first-generation parents. These conflicts often arise from contrasting views on intergroup dating and marriage within multicultural households (Chung et al., 2001; Uskul et al., 2011).

Cultural disparities influenced by acculturation levels contribute significantly to intergenerational conflict, particularly evident among college students of diverse ethnic backgrounds such as Latinx, European American, and African American (Dennis et al., 2010). Negotiating between individualistic and collectivistic values presents a nuanced challenge, with first-generation immigrants often prioritizing familial values over personal preferences (Roysircar et al., 2010). This prioritization reflects various cultural contexts, including the imperative to uphold family honor, familial duty, and in-group unity (Chang, 2015; Dundes et al., 2009; Fuligni, 2002).

Intergenerational conflict has been linked to negative mental health outcomes, highlighting the need for further research into its impact on positive mental well-being and the interaction with positive resources like perceived social support.

Negative Psychological Consequences of Conflict

Family exerts a significant influence on a child's psychological adjustment, with relational quality impacting well-being through psychological, behavioral, and physiological pathways. Conflict and relational stressors within the family can lead to negative mental health outcomes, including perceived stress, depressive symptoms, negative well-being, and psychological distress (Thoits, 2010; Lee et al., 2001; Harker, 2001; Human et al., 2016). Immigrant young adults, particularly first and second generations, often experience higher levels of family obligations and responsibility, leading to greater distress compared to non-immigrant counterparts (Soria et al., 2013). Cultural discrepancies in parent-child conflicts can further strain relationships and are associated with lower well-being, stress, and distress (Constantine et al., 2006; Choi et al., 2008; Lee et al., 2005). Intergenerational family 6 conflict is linked to psychological distress in various demographic groups, with Asian Americans reporting particularly high levels due to cultural values like filial piety (Lee et al., 2001). Immigrant populations are significantly impacted by familial conflict, often lacking access to proper resources or social support (Lui, 2015; Hefner et al., 2009). Social support serves as a protective buffer against poor mental well-being in young adults (Harker, 2001). Understanding the role of positive social support in buffering mental health consequences and its relationship with intergenerational conflict is crucial for addressing these negative outcomes.

Perceived Social Support as a Protective Factor

Social support acts as a vital protective factor and coping mechanism against negative mental health outcomes, with contributions from family, friends, and significant others. While intergenerational conflict can compromise mental health, social support offers promise in mitigating these effects (Thoits, 2010; Pearlin, 1999). Utilizing social support as a coping strategy in managing familial conflicts has been associated with positive mental health outcomes in college students, alleviating symptoms of depression and emotional distress (Ahn et al., 2009; Human et al., 2016; Sharpley et al., 2015; Harandi et al., 2017).

Specific scopes of social support, such as friendship

support, play crucial roles in buffering negative effects on mental health (Kim et al., 2012). Parental social support serves as a mediator for familial cultural conflict, positively impacting subjective well-being, even in the presence of parent-child conflict (Yang et al., 2013). Particularly, both positive familial and friend support were found to buffer negative emotional distress outcomes (Lerman et al., 2021), highlighting the importance of various forms of social support in fostering positive psychological outcomes. Overall, social support from social circles effectively buffers negative psychological symptoms and enhances well-being (Wang et al., 2008).

The Current Study

The present study explored the relationship between intergenerational conflict, mental well-being, psychological distress, and perceived social support. Particularly, this study replicates previous research with modifying the Intergenerational Conflict Scale for broader population usage (Chung et al., 2001; Dennis et al., 2010; Rasmi et al., 2015). This study also introduces a novel usage of the 7 intergenerational conflict scale, by applying this scale to include all ethnic population groups including Latinx, Asian American, European American, African American, and Middle Eastern populations. Moreover, this study implemented inclusion of 1st 5th generations identifying immigrant background individuals.

Intergenerational conflict is assessed in terms of discrepancies in values related to family expectations, career/educational goals, and dating/marriage values. Mental well-being is evaluated based on subjective experiences of life satisfaction, happiness, mental health functioning, and eudaimonic perspective. Psychological distress measures self-reported anxiety and depressive symptoms over the past month. Perceived social support gauges self-perception of support from family, friends, and significant others.

The following predictions were made for this study. In the primary hypothesis (H1a) it was predicted that higher intergenerational conflict will be associated with decreased mental well-being. In the secondary hypothesis (H1b) it was predicted that higher intergenerational conflict will be associated with higher psychological distress. In the third hypothesis (H2a) it was predicted that perceived social support will moderate the relationship of intergenerational conflict and mental well-being. In the fourth hypothesis (H2b) it was predicted that perceived social support will moderate the relationship of intergenerational conflict and psychological distress.

Method

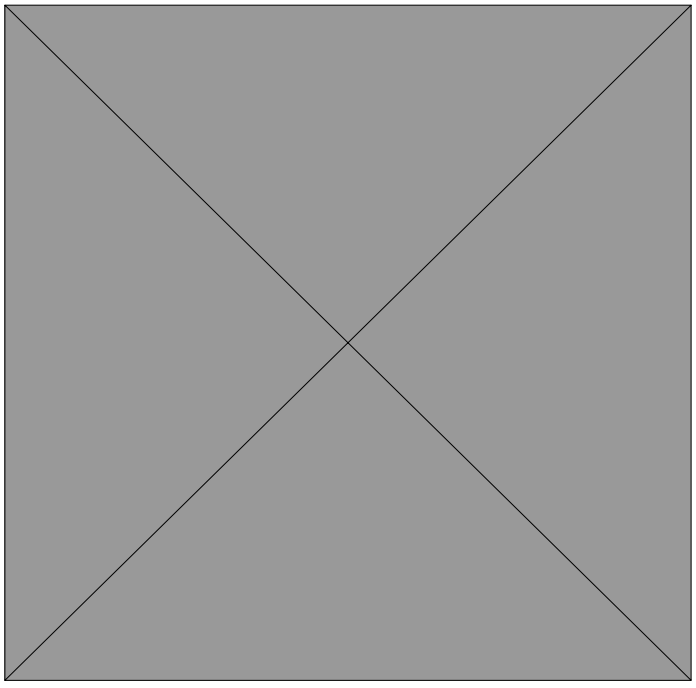
Participants

The 195 participants in this study were recruited through convenience sampling of the students enrolled at the University of San Francisco's General Psychology course and random sampling from Amazon Mechanical Turk. In order to be considered for this study, participants needed to be at the minimum age of 18 years old, fluent in English, and consent to being questioned on the following topics found in the Measures section. Students from USF's Psyc101 who signed up to participate in this study received 1 hour of course credit. Mturk participants earned $1 of compensation for their participation. Informed consent forms were also obtained, which detailed the 8 nature of the study, confidentiality, posed risks and benefits to subjects, as well as their rights as participants.

One-hundred ninety-five adults between the ages 18 and 55, of the combined sample from University of San Francisco and Amazon Mechanical Turk, were utilized in this study. 100 surveys from USF's Psyc101 pool were gathered through SONA and 95 surveys were kept in the study. 180 surveys were gathered from Mturk and 100 were kept in the study. In total, of the 280 surveys distributed, 195 were able to be used for this study. Surveys were not kept and utilized for the study if participants provided incomplete surveys, straight-lined responses, self-contradictory answers, or completed the survey in under 3 minutes.

The average age of the participants utilized was 26.9 years old. In regards to gender, 41.5% were Female, 56.4% were Male, and 2.1% were Non-Binary (Figure 1). In regards to race and ethnicity, participants in this study were composed of the following; 53.1% European American/Caucasian, 24.1% Asian/Pacific Islander, 9.7% Latinx, 6.2% African American/Black, 2.1% Middle Eastern, 4.6% other (Figure 1). Participants' generational status consisted of: 10.7% first generational status, 31.6% second generational status, 12.2% third generational status, 9.2% fourth generational status, 36.3% fifth generational status (Figure 1).

Figure 1
Demographics Table



Note. Figure depicts self-report of age, gender, racial & ethnic identity, and generational status for the combined sample of Amazon Mechanical Turk and USF participants.

Materials

Intergenerational Conflict Inventory

The Intergenerational Conflict Inventory (Chung, 2001) is a 24-item measure that assesses the type (family expectations, education and career, dating and marriage) and severity of intergenerational conflict between young adults/adolescents and their parents. Responses were recorded on a 6-point Likert scale (1=Strongly Disagree; 2=Disagree; 3=Slightly Disagree; 4=Slightly Agree; 5=Agree; 6=Strongly Agree). Participants were told to indicate how much conflict each item causes between them and their parents, and to answer according to the most conflict they experience regardless of which 10 parent, with an answer from 1-6. An example of a question that was asked is,"Which career to pursue." Previous studies support this scale's validity in the following areas; this scale's validity and positively correlated in discrepancies in Asian values with parent(s) with intergenerational conflict (Tsai-Chae et al., 2008). The scale was designed for cultural competency of the immigrant experience for Asian Americans, but has been adapted into other cultural groups such as Latinx and Arab populations (Dennis et al., 2010; Rasmi et al., 2015). In this study, the following ethnic groups are included: Asian/Pacific Islander, Latinx, Middle Eastern, African American, European American. The wording for the fourth item was modified from "Asian heritage" to "native heritage" in order to apply inclusivity for the diverse, broader population of the study. Such that it went from "Pressure to learn one's own Asian language" to "Pressure to learn one's own native heritage language."

Multidimensional Scale of Perceived Social Support

The Multidimensional Scale of Perceived Social Support is a 12-item measure that assesses the levels of perceived social support in relationships between family members, friends, and significant others. Responses were recorded on a 7-point Likert scale (1=Strongly Disagree; 2=Disagree; 3=Slightly Disagree; 4=Neither 5=Slightly Agree; 6=Agree; 7=Strongly Agree). Participants were asked about how they felt about the given statements and told to indicate how they feel about each statement by choosing an answer from 1-7. An example of a question that was asked is,"There is a special person in my life who cares about my feelings." This scale has been utilized on diverse range of populations including university students, adolescents, adult populations, and elderly/older adults (Aloba et al., 2020; Zimet et al., 1988; Wittenborn et al., 2020; Stanley et al., 1988; Pérez-Villalobos et al., 2021).

Kessler Psychological Distress Scale

The Kessler Psychological Distress Scale is a 10-item measure that uses a 5-point Likert scale (1 = none of the time, 2 = a little of the time, 3 = some of the time, 4 = most of the time, 5 = all of the time). This questionnaire intended to measure distress based on questions about anxiety and depressive symptoms that a person has experienced in the most recent 4 week period. 11 Participants were given statements about feelings and thoughts and asked to pick from answers 1-5 about their experience over the last 30 days. An example of a question that was asked is,"During the last 30 days, about how often did you feel worthless?" Scores ranged from 10 to 50. Scores under 20 are rated likely to be well. Scores 20-24 were rated likely to have a mild mental disorder. Scores 25-29 were rated as likely to have a moderate mental disorder. Scores that were 30 and over were rated as likely to have a severe mental disorder/psychological distress. The Kessler Psychological Distress Scale (K10) is a well-validated, highly useful clinical measure of psychological symptoms noted for its ease of use, accessibility, high predictability, and high factorial and construct validity (Kessler et al., 2002). Moreover, this measure has been validated with diverse groups, such as Australian, French, and Chinese populations (Furukawa et al., 2003; Arnaud et al., 2010, Chan et al., 2014). Additionally, it is unidimensional and holds high predictive validity (Smout, 2019). Particularly, it has been effectively utilized as a predictive factor for mental disorders and symptoms such as depression (Smout, 2019).

Warwick Edinburgh Mental Well-being Scale

The Warwick Edinburgh Mental Well-being Scale is a 10-item scale that measures on a 5-point Likert scale (1 = none of the time, 2 = rarely, 3 = some of the time, 4 = often, 5 = all of the time). The Warwick Edinburgh Mental Well-being Scale is a scale that focuses primarily on positive elements of mental health; it is intended to assess both the emotional and cognitive components of mental health. This questionnaire covers a large range of well-being components such as affective-emotional aspects, cognitive-evaluative dimensions, subjective well-being and psychological functioning. Participants were given statements about feelings and thoughts and asked to pick from answers 1-5 about their experience over the last 2 weeks. An example of a question that was asked is,"I've been feeling good about myself." Scores were categorized in the following method; from 0-32 points well-being points is very low, 32-40 points well-being score is below average, 40-59 points well-being score is average, 59-70 points well-being score is above average. This scale has been reported 12 to have high construct validity, internal consistency, criterion validity, and test-retest reliability (Tennant et al., 2007).

Procedure

Participants took the survey from their laptop through the provided survey Qualtrics link. Participants were asked to work alone in a quiet, non-distracting environment and were instructed to email the researcher if they had any questions before or after the study. Participants were notified that this survey may take up to an hour to complete. Students from USF's Psyc101 who signed up to participate in this study received 1 hour of course credit, while Mturk participants earned

$1 of compensation for their participation. Participants were told that they could withdraw from the experiment at any time if they felt uncomfortable, unwilling, or unable to complete the study. After participants signed the digital consent form through Qualtrics, they were given the following questionnaires to proceed with the study. The first set of measures that was offered was the Demographics Questionnaire, which included background information of age, ethnicity, gender, school year, and generational status. Following the Demographic Questionnaire, in randomized order, other measures included: Intergenerational Conflict Inventory, Multidimensional Scale of Perceived Social Support, Kessler Psychological Distress Scale, Warwick Edinburgh Mental Well-being Scale.

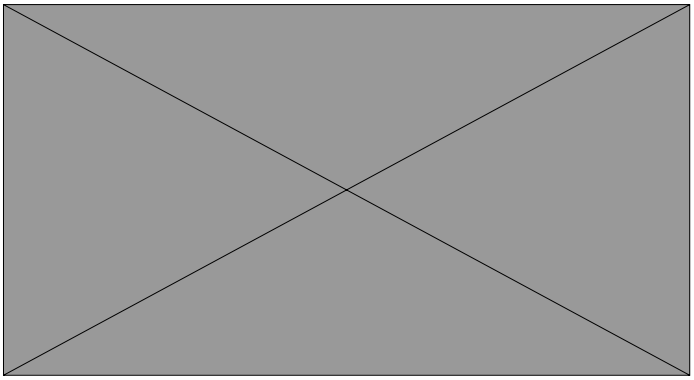
Results

Intergenerational Conflict on Mental Well-Being and Psychological Distress

The first hypothesis examined the relationship between intergenerational conflict and mental well-being with an independent samples t test. The relationship was significant between intergenerational conflict and mental well-being. Those who reported high intergenerational conflict had lower well-being, M = 45.1, SD = 8.33, compared to those who indicated low intergenerational conflict, M = 49.7, SD = 9.72, t(193) = -3.56, p <.001 (Figure 4).

Figure 4

Influence of Intergenerational Conflict on Mental Well-Being

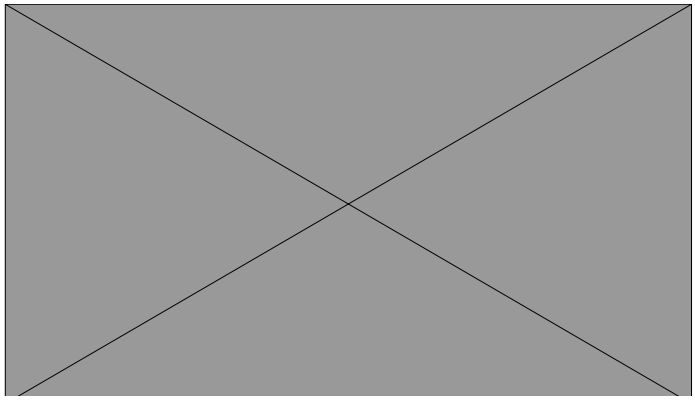


Note. Figure depicts high and low intergenerational conflict and mental well-being. The relationship between intergenerational conflict and mental well-being was significant, t(193) = -3.56, p <.001. Intergenerational Conflict was measured with the Intergenerational Conflict Inventory. Mental well-being was measured with the Warwick Edinburgh Mental Well-being Scale.

For hypothesis 1b, the relationship between intergenerational conflict and psychological distress was analyzed through an independent samples t test. The relationship was significant between intergenerational conflict and psychological distress Those who reported high intergenerational conflict had greater psychological distress, M = 27.4, SD = 8.87, than those who indicated low intergenerational conflict, M = 24.4, SD = 9.52, t(193) = 2.31, p = .022 (Figure 5).

Figure 5

Influence of Intergenerational Conflict on Psychological Distress



Note. Figure depicts high and low intergenerational conflict and psychological distress. The relationship between intergenerational conflict and psychological distress was significant, t(193) = 2.31, p = .022. Intergenerational Conflict was measured with the Intergenerational Conflict Inventory. Psychological distress was measured with the Kessler Psychological Distress Scale.

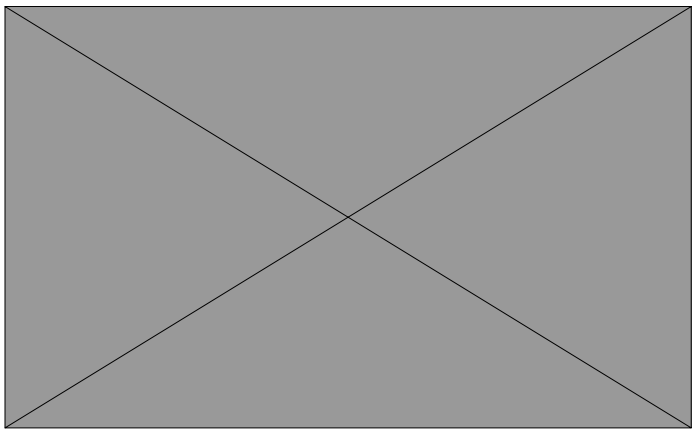
The Moderating Relationship of Perceived Social Support on Intergenerational Conflict and Psychological Consequences

Prior to analyzing hypothesis 3 and hypothesis 4, mean centering of predictor variables were conducted. Mean centering aided de-collineraization and stabilization of linear associative effects. This provided a balanced interpretation of the interactions between variables and group effects.

For hypothesis 2a, the moderating relationship of perceived social support on the relationship of intergenerational conflict and mental well-being was tested with a hierarchical multiple regression analysis. Perceived social support slightly moderated the relationship between intergenerational conflict and mental well-being. Results showed that intergenerational conflict predicted mental well-being, B = -.090 SE = .03, β =-.190, t = -2.72, p = .007, and that perceived social support predicted mental well-being, B = .153, SE = .05, β =.226, t = 2.99, p = .003. However, moderation was not supported, as the cross-product term of perceived social support and intergenerational conflict did not reach 15 significance for mental well-being, B = .003, SE = .003, β = .061, t = .82, p = .41, R 2 = .092, F(3, 191) = 6.46 (Figure 6).

Figure 6

The Moderating Relationship of Perceived Social Support on Intergenerational Conflict and Mental Well-Being



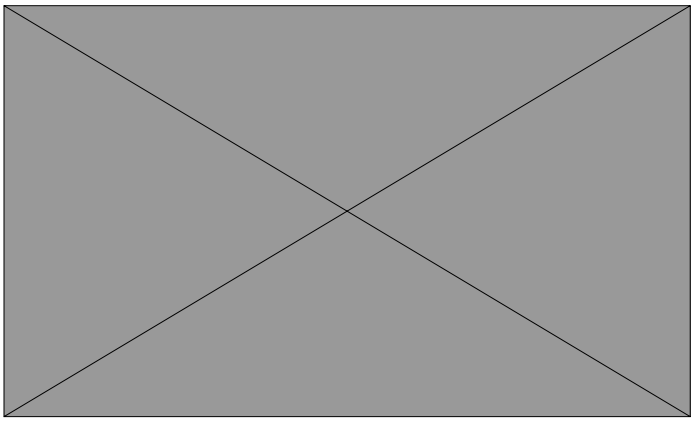
Note. Figure depicts the moderating role of perceived social support on the relationship between intergenerational conflict and mental well-being. The moderating role of perceived social support on intergenerational conflict and mental well-being was not significant (p = .41). Perceived social support was measured with the Multidimensional Scale of Perceived Social Support. Intergenerational conflict was measured with the Intergenerational Conflict Inventory. Mental well-being was measured with the Warwick Edinburgh Mental Well-being Scale.

A two-way ANOVA was conducted to examine the effects of intergenerational conflict (low and high) and perceived social support (low and high) on mental well-being. A significant effect for intergenerational conflict was found, F(1, 191) = 8.95, p<.01, η 2= .04. A significant effect for perceived 16 social support was also found, F(1, 191) = 7.51, p<.01, η 2= .03. The main effect for one's intergenerational conflict indicated that those with low intergenerational conflict had high mental-wellbeing more so than those who had high intergenerational conflict, Mhigh= 45.3, S.E.high = 0.9; Mlow = 49.2, S.E.low = 0.942. In the two-way ANOVA post hoc analysis, it was indicated that this difference was driven by those in the perceived social support condition. In the low perceived social support condition, mean differences of intergenerational conflict was found to be, p<.01, Mhigh = 43.8, S.E.high = 1.18; Mlow = 47.2, S.E.low = 1.48, while in the high perceived social support condition, mean differences of intergenerational conflict was found to be, p<.01, Mhigh = 46.8, S.E.high = 1.36; Mlow = 51.2, S.E.low = 1.16.

For hypothesis 2b, the moderating relationship of perceived social support on the relationship of intergenerational conflict and psychological distress was tested with a hierarchical multiple regression analysis. Perceived social support significantly moderated the relationship between intergenerational conflict and psychological distress. Results showed that intergenerational conflict predicted psychological distress, B = .088, SE = .03, β = .185, t = 2.65, p = .009. It was found that perceived social support significantly predicted psychological distress, B = -.117, SE = .051, β =-.173, t = -2.28, p = .023. Thus, moderation was supported, as the cross-product term of perceived social support and intergenerational conflict reached significance for psychological distress, B = –.008, SE = .003, β =-.218, t = –2.91, p = .004, R 2 = .088, F(3, 191) = 6.13, p < .001 (Figure 8).

Figure 8

The Moderating Relationship of Perceived Social Support on Intergenerational Conflict and Psychological Distress



Note. Figure depicts the moderating relationship of perceived social support on intergenerational conflict and psychological distress. The moderating role of perceived social support on intergenerational conflict and psychological distress was significant (p = .004). Perceived social support was measured with the Multidimensional Scale of Perceived Social Support. Intergenerational conflict was measured with the Intergenerational Conflict Inventory. Psychological distress was measured with the Kessler Psychological Distress Scale.

A two-way ANOVA was conducted to examine the effects of intergenerational conflict (low and high) and perceived social support (low and high) on psychological distress. Effect approached significance for intergenerational conflict on psychological distress, F(1, 191) = 2.82, p= .095, η 2= .01. A significant effect for perceived social support on psychological distress was found, F(1, 191) = 10.8, p<.01, η 2= .05. The main effect for one's intergenerational conflict indicated that those with high intergenerational conflict had higher psychological distress than those who had low intergenerational conflict, Mhigh= 27.1, S.E.high = 0.908; Mlow = 24.9, S.E.low = 0.951. Additionally, post hoc analyses indicated that this difference was driven by those in the perceived social support condition. In the two-way ANOVA post hoc analysis, the relationship in the low perceived social support condition, mean 18 differences of intergenerational conflict was found to be, p = .095, Mhigh = 29.2, S.E.high = 1.19; Mlow = 27.1, S.E.low = 1.50, while in the high perceived social support condition, mean differences of intergenerational conflict was found to

be, p =.095, Mhigh = 25.0, S.E.high = 1.37; Mlow = 22.7, S.E.low = 1.17.

Discussion

The present study explored the relationship between intergenerational conflict, mental well-being, psychological distress, and perceived social support. Results indicate that there are notable relationships between intergenerational conflict and mental health components, particularly mental well-being (positive mood and stress) and psychological distress (depression and anxiety symptoms). Harker et al. (2001) found that intergenerational conflict can negatively impact aspects in adolescents, such as well-being. The current study brings light to these issues on an adult population, particularly in the psychological consequences scope. In addition, Wang et al. (2008) showed that positive perceived support buffered negative well-being. Expanding on this, the current study utilized perceived social support in a moderation analysis to examine the ways it can buffer the relationship between intergenerational conflict and mental health outcomes. These findings highlight the impact perceived social support can have on familial and mental health dynamics. Moreover, this directs how powerful and useful positive perceived social support can be as a coping resource.

Intergenerational Conflict and Psychological Consequences

In hypothesis 1a and 1b, the relationship between intergenerational conflict and mental health outcomes was examined. In hypothesis 1a intergenerational conflict was found to be significantly associated with mental well-being, such that those who rated high in intergenerational conflict had poorer mental well-being. In hypothesis 1b intergenerational conflict was found to be significantly associated with psychological distress, such that those who rated high in intergenerational conflict had higher psychological distress. These findings confirm previous literature and existing findings, in regards to how familial conflict can be associated with harmful mental health outcomes (Thoits, 2010; Lee et al., 2001). Prior research examined other mental health factors including stress, depressive symptoms, and 19 well-being (Lee et al., 2001; Harker, 2001; Human et al., 2016). Uniquely, this study examined intergenerational conflict on positive state of mental well-being and anxiety and depressive symptoms (psychological distress). Moreover, the basis of these findings came from a diverse sample which allowed the exploration of this phenomenon on a more representative sample. Thus, the implications of intergenerational conflict on mental health outcomes were explored among European Americans, African Americans, Latinx, Middle Eastern, and Asian American persons. Such findings illuminate the need for culturally-sensitive and competent support services that would aid to provide alleviation of adverse effects stemming from intergenerational conflict experiences. While Counseling and Psychological Services (CAPS) is a general resource for the college student population, other methods of support such as therapy support groups to mental health and educational workshops may serve to further address this phenomenon.

Perceived Social Support, Intergenerational Conflict, and Psychological Consequences

In addition to observing the interactions between intergenerational conflict and psychological consequences, the current study explored intergenerational familial conflict in relation to mental health and social support dynamics. In hypothesis 2a, perceived social support had a slight impact on the relationship between intergenerational conflict and psychological distress. Although not significantly moderated, perceived social support was significantly associated with intergenerational conflict as well as psychological distress. This captures the profound impact perceived social support can hold over these components individually.

In hypothesis 2b, perceived social support was found to be significantly impactful to the relationship of intergenerational conflict and psychological distress. Perceived social support was found to substantially buffer the negative effects from the relationship of intergenerational conflict and psychological distress, such that when high perceived social support was present, adverse effects were minimized, comparably to if low perceived social support was present.

These findings add to existing literature regarding the substantial impact of social support. Chang (2015) found that great social support was associated with positive psychological health. Inversely, in another study, it was found that those with low social support had worse well-being (Yang et al., 2013). This finding from Yang et al. (2013) is built further in H2b, such that when social support was low, intergenerational conflict and psychological distress was much higher comparably if social support was high.

Limitations

A core limitation in this study was the low generalizability of the results to the general population. Nearly half of this study's population utilized a convenience sample of the University of San Francisco's Psyc101 student pool. The Psyc101 pool consisted of primarily freshman-year level students, thus providing a young adult population group that recently graduated from high school, suggesting lower external validity and representative bias towards a young adult population. Furthermore, more than half of this study's population was composed of random sampling from the general population through Amazon Mechanical Turk. Amazon Mechanical Turk offers access to a diverse, wide-range pool of people who take online surveys for monetary compensation. While this platform ensures demographic diversity, respondents often engage in multiple surveys daily, potentially leading to reduced engagement and effort. Consequently, a significant portion of the Mechanical Turk sample was excluded from the analysis due to low engagement levels. To enhance the study's generalizability and inclusivity, future research endeavors should

adopt larger, randomized sampling strategies from the general population.

The current study utilized and examined four measures, precluding exploration of other potential covariates or ancillary factors in the moderation analyses. These unexamined variables may have provided additional predictor variables, such as variables considering stressors associated with academic or occupational environments to psychosocial considerations, like isolation. Consequently, the absence of other variables may inadvertently magnify the perceived strength and significance of the moderating relationships within this study. A more comprehensive consideration of unaccounted variables within the relationship matrix is imperative to ensure a more well-rounded understanding of the underlying dynamics regarding intergenerational conflict and subsequent dynamics.

A potentially large contributing influence to the outcomes found in this study is the unprecedented crisis of the COVID-19 pandemic. This study was administered during the fall 2021 semester, thus, a year after the pandemic swept the nation in 2020. Due to the pandemic, adults across the United States have reported greater symptoms of anxiety and depression (Yarrington et al., 2021). Thus the mental health outcomes found in this study may be impacted and influenced by the current pandemic situation. In addition, another impactful factor due to the COVID-19 pandemic includes the stay-at-home order which markedly altered and reshaped the experiences of young adults enrolled in college during this period. Subsequent pandemic regulations like the stay-at-home order may have led to much greater exposure around one's family than in a normal circumstance without the pandemic, which may increase the likelihood of conflict. College students who stayed at home due to the pandemic have reported that factors such as having more negative interaction with a parent and perceiving less parental acceptance about being home has greatly impacted negative mental health (Hall et al., 2021). Subsequent negative interactions have impacted mental health decline in the college student population (Hall et al., 2021). Such negative familial instances students are experiencing is an important stress-related factor to consider, that may impart risk on psychological consequences, stemming from the unique predicament of the pandemic (Behar-Zusman et al., 2020).

Future Research

A novel finding that was examined in the study, was the moderating impact of perceived social support on intergenerational conflict and mental health outcomes. Within this framework, perceived social support emerged as a potential buffering mechanism and positive coping resource. Specifically, social support demonstrated strong efficacy in mitigating the adverse effects stemming from the interplay between intergenerational conflict and psychological distress. These findings underscore the significance of further inquiry into intergenerational conflict, mental health outcomes, and other buffering support systems, such as counseling, support groups, or community engagement that may also aid in reducing subsequent negative mental health outcomes. Furthermore, the exploration of alternative protective factors capable of moderating and attenuating adverse outcomes, such as individual self-coping mechanisms like resilience, perseverance, and motivational factors, would support garnering understanding for further buffering strategies.

The current study explored intergenerational conflict through the lens of negative interactions within a family system, with parents and children, where generational differences may evoke dissonance and disagreement. While intergenerational conflict may impact negative mental health outcomes, it may also serve to be a source of strength. Such intergenerational conflict may serve to build self-efficacy, 22 self-determination, tenacity, and resilience. Further insight on the positive outcomes of intergenerational conflict must be further investigated to gain a multifaceted understanding of intergenerational conflict. The primary focus of investigation in this study was the experiences of adult children navigating intergenerational conflict within their familial contexts. Expanding the scope of inquiry to include other family members, particularly parents within the parent-child dynamic, would aid to illuminate further understanding of cultural disparities and disagreements. Moreover, delving into other explanatory variables, such as levels of acculturation and assimilation alongside intergenerational dynamics, would offer additional insights into underlying discord in familial parent-child dynamics. Within the demographic pool in this study, it is important to highlight that the ethnic/racial identity majority primarily consisted of Asian American and European American participants. As such, this study lacked an equitable representation of all ethnic/racial identities in the analysis. Subsequent research endeavors should seek to recruit a more diverse and balanced participant pool to comprehensively explore the implications of intergenerational conflict.

While the current study analyzed a data pool of a diverse group of individuals from the United States, a global cross-cultural analysis would garner a more comprehensive outlook and understanding of various cultural intergenerational conflict nuances. Examining intergenerational dynamics across different countries, including nations with similar ethnically-diverse populations to America, such as Canada and Singapore, may provide an optimal comparative analysis to observe across diverse cultural landscapes.

Conclusion

In conclusion, the present study sheds light on the intricate relationship between intergenerational conflict and various dimensions of mental health, including mental well-being and psychological distress. The current study builds upon prior research of intergenerational conflict in immigrant populations, by extending the understanding of these dynamics to a wide-range of immigrant generational status' and ethnic/racial background. Subsequently, the diverse sample utilized

in the study allows for a more representative exploration of these phenomena among various ethnic and cultural groups in the United States.

Importantly, this study underscores the imperative of addressing intergenerational conflict as a significant determinant of mental health outcomes. The recognition of the effects of familial discord on individuals' psychological well-being highlights the urgent need for targeted interventions aimed at mitigating adverse consequences and supporting coping techniques of strenuous familial dynamics with immigrant adult children. By recognizing the harmful effects of familial discord on individuals' psychological well-being, development of targeted interventions aimed at mitigating the adverse consequences of intergenerational conflict and promoting healthier family dynamics, can be better understood and navigated.

Furthermore, the findings in this study particularly emphasized the pivotal role of positive support in buffering the negative impact of intergenerational conflict on mental health. By illuminating the protective effects of supportive relationships, this study underscores the importance of fostering positive support systems. Future studies may seek to address structural supports and provisions, such as culturally-attuned support groups and workshops within communities and at institutions like universities, that may provide an empowering space through communal support, to address the unique needs and challenges individuals may face when managing intergenerational conflict.

Recognizing the complex interplay between family dynamics and mental health, community members, institutions like universities, and practitioners can better support individuals in navigating and coping with these conflict-related stressors and challenges with culturally-attuned educational and mental health resources. By recognizing and addressing such complex interplay between immigrant family dynamics and mental health, we can work towards fostering greater support, well-being, and coping strategies.

References

Ahn, A. J., Kim, B. S. K., & Park, Y. S. (2009). Asian cultural values gap, cognitive flexibility, coping strategies, and par ent-child conflicts among Korean Americans. Asian American Journal of Psychology, S(1), 29–44. https://doi.org/10.1037/1948-1985.S.1.29

Alsubaie, M. M., Stain, H. J., Webster, L. A. D., & Wadman, R. (2019). The role of sources of social support on depres sion and quality of life for university students. International Journal of Adolescence and Youth, 24(4), 484-496. https://doi.org/10.1080/02673843.2019.1568887

Aloba, O., Opakunle, T., & Ogunrinu, O. (2019). Psychomet ric characteristics and measurement invariance across gen ders of the Multidimensional Scale of Perceived So cial Support (MSPSS) among Nigerian adolescents. Health Psychology Report, 7(1), 69-80. https://doi.org/10.5114/hpr.2019.82629 24

Arnaud, B., Malet, L., Teissedre, F., Izaute, M., Moustafa, F., Geneste, J., ... & Brousse, G. (2010). Validity study of Kes sler's psychological distress scales conducted among patients admitted to French emergency department for alcohol consumption–related disorders. Alcoholism: Clin ical and Experimental Research, 34(7), 1235-1245. https://doi.org/10.1111/j.1530-0277.2010.01201.x

Behar-Zusman, V., Chavez, J. V., & Gattamorta, K. (2020). De veloping a measure of the impact of COVID-19 social distancing on household conflict and cohesion. Family process, 59(3), 1045-1059. https://doi.org/10.1111/famp.12579

Cepa, K., & Kao, G. (2019). Cultural Preferences or Financial Constraints? Understanding Racial and Ethnic Differences in Family Attitudes and Parental Coresidence in Young Adulthood. Journal of Family Issues, 40(12), 1705–1728. https://doi.org/10.1177/0192513X19842224

Chan, S. M., & Fung, T. C. T. (2014). Reliability and validity of K10 and K6 in screening depressive symptoms in Hong Kong adolescents. Vulnerable Children and Youth Stud ies, 9(1), 75-85. https://doi.org/10.1080/17450128.2013.861620

Chang, J. (2015). The interplay between collectivism and so cial support processes among Asian and Latino Ameri can college students. Asian American Journal of Psychol ogy, 6(1), 4. https://doi.org/10.1037/a0035820

Choi, Y., He, M., & Harachi, T. W. (2008). Intergenerational Cul tural Dissonance, Parent-Child Conflict and Bonding, and Youth Problem Behaviors among Vietnamese and Cambo dian Immigrant Families. Journal of youth and adoles cence, 37(1), 85–96. https://doi.org/10.1007/s10964-007-9217-z

Chung, R. H. (2001). Gender, ethnicity, and acculturation in in tergenerational conflict of Asian American college stu dents. Cultural Diversity and Ethnic Minority Psychology, 7(4), 376-386. https://doi.org/10.1037/1099-9809.7.4.376

Clarke, E. J., Preston, M., Raksin, J., & Bengtson, V. L. (1999). Types of conflicts and tensions between older par ents and adult children. The Gerontologist, 39(3), 261-270. https://doi.org/10.1093/geront/39.3.261

Constantine, M. G., & Flores, L. Y. (2006). Psychological distress, perceived family conflict, and career development issues in college students of color. Journal of Career Assessment, 14(3), 354-369. https://doi.org/10.1177/1069072706286491

Dennis, J., Basañez, T., & Farahmand, A. (2010). Intergenera tional Conflicts Among Latinos in Early Adulthood: Sepa rating Values Conflicts With Parents From Acculturation Conflicts. Hispanic Journal of Behavioral Sciences, 32(1), 118–135. https://doi.org/10.1177/0739986309352986

Dundes, L., Cho, E., & Kwak, S. (2009). The duty to SUCCEED: Honor Versus happiness in college and career choices of East Asian students in the United States. Pastoral Care in Education, 27(2), 135-156. https://doi.org/10.1080/02643940902898960

Fuligni, A. J., Tseng, V., & Lam, M. (1999). Attitudes toward

family obligations among American adolescents with Asian, Latin American, and EUROPEAN BACKGROUNDS. Child Development, 70(4), 1030-1044. https://doi.org/10.1111/1467-8624.00075

Fuligni, A. J. (2001). Family obligation and the academic motivation of adolescents from asian, latin american, and european backgrounds. New Directions for Child and Adolescent Development, 2001(94), 61. https://doi.org/10.1002/cd.31

Fuligni, A. J., & Pedersen, S. (2002). Family obligation and the transition to young adulthood. Developmental Psychology, 38(5), 856-868. https://doi.org/10.1037/0012-1649.38.5.856

Furukawa TA, Kessler RC, Slade T, Andrews G. (2003) The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of mental health and well-being. Psychol Med. 33, 357–362. https://doi.org/10.1017/S0033291702006700

Hall, S. S., & Zygmunt, E. (2021). "I Hate It Here": Mental Health Changes of College Students Living With Parents During the COVID-19 Quarantine. Emerging Adulthood, 9(5), 449–461. https://doi.org/10.1177/21676968211000494

Hannum, J. W., & Dvorak, D. M. (2004). Effects of family conflict, divorce, and attachment patterns on the psychological distress and social adjustment of college freshmen. Journal of College student development, 45(1), 27-42. https://doi.org/10.1353/csd.2004.0008

Harandi, T. F., Taghinasab, M. M., & Nayeri, T. D. (2017). The correlation of social support with mental health: A meta-analysis. Electronic physician, 9(9), 5212–5222. https://doi.org/10.19082/5212

Harker, K. (2001). Immigrant generation, assimilation, and adolescent psychological well-being. Social forces, 79(3), 969-1004. https://doi.org/10.1353/sof.2001.0010 Hefner, J., & Eisenberg, D. (2009). Social support and mental health among college students. The American journal of orthopsychiatry, 79(4), 491–499. https://doi.org/10.1037/a0016918

Human, L. J., Dirks, M. A., DeLongis, A., & Chen, E. (2016). Congruence and incongruence in adolescents' and parents' perceptions of the family: Using response surface analysis to examine links with adolescents' psychological adjustment. Journal of Youth and Adolescence, 45(10), 2022-2035. https://doi.org/10.1007/s10964-016-0517-z

Hwang, W.C. (2006). Acculturative family distancing: Theory, research, and clinical practice. Psychotherapy: Theory, Research, Practice, Training, 43(4), 397–409. https://doi.org/10.1037/0033-3204.43.4.397

Kessler, R.C., Andrews, G., Colpe, L.J., Hiripi, E., Mroczek, D.K., Normand, S.L.T., Walters, E.E. and Zaslavsky, A.M. (2002) Short Screening Scales to Monitor Population Prevalences and Trends in Non-Specific Psychological Distress. Psychological Medicine, 32, 959-976. https://doi.org/10.1017/S0033291702006074

Kalibatseva, Z., Leong, F. T. L., Ham, E. H., Lannert, B. K., & Chen, Y. (2017). Loss of face, intergenerational family conflict, and depression among Asian American and European American college students. Asian American Journal of Psychology, 8(2), 126–133. https://doi.org/10.1037/aap0000067

Khallad, Y., & Jabr, F. (2016). Effects of perceived social support and family demands on college students' mental well-being: A cross-cultural investigation. International journal of psychology : Journal international de psychologie, 51(5), 348–355. https://doi.org/10.1002/ijop.12177

Kim, E. (1993). Career choice among second-generation Korean-Americans: Reflections of a cultural model of success. Anthropology & Education Quarterly, 24(3), 224–248. https://doi.org/10.1525/aeq.1993.24.3.05x0969g

Kim, E. (2009). Navigating college life: The role of peer networks in first-year college adaptation experience of minority immigrant students. Journal of The First-Year Experience & Students in Transition, 21(2), 9-34. Retrieved November 10, 2021, from https://eric.ed.gov/?id=EJ867702

Kim, J., Suh, W., Kim, S., & Gopalan, H. (2012). Coping strategies to manage immigration stress: Meaningful activity participation, social support, and positive emotion among Korean immigrant adolescents in the USA. International Journal of Qualitative Studies on Health and Well-Being, 7(1), 1–10. https:///doi.org/10.3402/qhw.v7i0.18870

Lee, R. M., & Liu, H.-T. T. (2001). Coping with intergenerational family conflict: Comparison of Asian American, Hispanic, and European American college students. Journal of Counseling Psychology, 48(4), 410–419. https://doi.org/10.1037/0022-0167.48.4.410

Lee, Richard & Su, Jenny & Yoshida, Emiko. (2005). Coping With Intergenerational Family Conflict Among Asian American College Students. Journal of Counseling Psychology. 52(3). 389-399. https://doi.org/10.1037/0022-0167.52.3.389.

Lee, J. J., Sax, L. J., Kim, K. A., & Hagedorn, L. S. (2004). Understanding students' parental education beyond first-generation status. Community College Review, 32(1), 1-20. https://doi.org/10.1177/009155210403200101

Lerman Ginzburg, S., Lemon, S.C., Romo, E. et al. (2021) Social support and strain and emotional distress among Latinos in the northeastern United States. BMC Psychology, 9(40) https://doi.org/10.1186/s40359-021-00544-3

Lui P. P. (2015). Intergenerational cultural conflict, mental health, and educational outcomes among Asian and Latino/a Americans: Qualitative and meta-analytic review. Psychological bulletin, 141(2), 404–446. https://doi.org/10.1037/a0038449

Ma, P. W., & Yeh, C. J. (2005). Factors influencing the career decision status of Chinese American youth. The Career Development Quarterly, 53(4), 337-347. https://doi.org/10.1002/j.2161-0045.2005.tb00664.x

Pearlin L. I. (1999). Stress and mental health: A conceptual overview. In A Handbook for the study of mental health: Social contexts, theories, and systems. 161–175. Cambridge University Press. Pérez-Villalobos, C., Briede-Westermeyer,

J. C., Schilling-Norman, M. J., & Contreras-Espinoza, S. (2021). Multidimensional scale of perceived social support: evidence of validity and reliability in a Chilean adapta tion for older adults. BMC geriatrics, 21(1), 1-8. https://doi.org/10.1186/s12877-021-02404-6

Phinney, J. S., & Baldelomar, O. A. (2011). Identity development in multiple cultural contexts. In Bridging cultural and de velopmental approaches to psychology: New syntheses in theory, research, and policy. 161–186. Oxford University Press.

Poon, O. (2014). "The Land of Opportunity Doesn't Apply to Everyone": The Immigrant Experience, Race, and Asian American Career Choices. Journal of College Student Devel opment 55(6), 499-514. https://doi.org/10.1353/csd.2014.0056.

Rasmi, S., & Daly, T. M. (2015). Intergenerational conflict in Arab families: Salient issues and scale development. Journal of Cross-Cultural Psychology, 47(42-53). https://doi.org/10.1177/0022022115605385

Roysircar, G., Carey, J., & Koroma, S. (2010). Asian Indian College Students' science and MATH PREFERENCES: In fluences of cultural contexts. Journal of Ca reer Development, 36(4), 324-347. https://doi.org/10.1177/0894845309345671

Sharpley, C., Wark, S., Hussain, R., McEvoy, M., & Attia, J. (2015). The influence of social support on psychological distress in older persons: an examination of interaction processes in australia. Psychological reports, 117(3), 883-896. https://doi.org/10.2466/21.10.PR0.117c27z5

Smokowski, P. R., Cotter, K. L., Robertson, C. I. B., & Guo, S. (2013). Anxiety and aggression in rural youth: Base line results from the rural adaptation project. Child Psy chiatry and Human Development, 44(4), 479-492. https://doi.org/10.1111/10.1007/s10578-012-0342-x

Smout, M. F. (2019). The factor structure and predictive va lidity of the Kessler Psychological Distress Scale (K10) in children and adolescents. Australian Psychologist, 54(2), 102-113. https://doi.org/10.1111/ap.12376

Soria, K., M., & Stebleton, M. J. (2013). Immigrant college stu dents' academic obstacles. The Learning Assistance Review, 18(1), 7-24. Retrieved from the University of Minnesota Digital Conservancy, https://hdl.handle.net/11299/150033.

Soria, K.M., & Stebleton, M. J. (2013b). Major decisions: Mo tivations for selecting a major, satisfaction, and be longing. NACADA Journal, 33(2), 29-43. doi: http://dx.doi.org/10.12930/NACADA-13-018

Stanley, M. A., Beck, J. G., & Zebb, B. J. (1998). Psychometric properties of the MSPSS in older adults. Aging & mental health, 2(3), 186-193. https://doi.org/10.1080/13607869856669

Su, J., Lee, R. M., & Vang, S. (2005). Intergenerational Family Con flict and Coping Among Hmong American College Stu dents. Journal of Counseling Psychology, 52(4), 482–489. https://doi.org/10.1037/0022-0167.52.4.482

Tang, M., Fouad, N. A., & Smith, P. L. (1999). Asian Americans' career choices: A PATH model to examine factors influenc ing their career choices. Journal of Vocational Behavior, 54(1), 142-157. https://doi.org/10.1006/jvbe.1998.1651

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., ... & Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. Health and Quality of Life Outcomes. Health and Quality of Life Outcomes, 5, 63. https://doi.org/10.1186/1477-7525-5-63

Thoits P. A. (2010). Stress and health: Major findings and policy implications. Journal of Health and Social Behavior, 51, 41–53. https://doi.org/10.1177/0022146510383499

Tsai-Chae, A. H., & Nagata, D. K. (2008). Asian values and percep tions of intergenerational family conflict among Asian American students. Cultural Diversity and Ethnic Minority Psychology, 14(3), 205–214. https://doi.org/10.1037/1099-9809.14.3.205

Urdan, T., Solek, M., & Schoenfelder, E. (2007). Students' per ceptions of family influences on their academic motiva tion: A qualitative analysis. European journal of psychology of education, 22(1), 7-21. https://doi.org/10.1007/BF03173686

Uskul, A. K., Lalonde, R. N., & Konanur, S. (2011). The Role of Culture in Intergenerational Value Discrepancies Regard ing Intergroup Dating. Journal of Cross-Cultural Psychology, 42(7), 1165–1178. https://doi.org/10.1177/0022022110383311

Vungkhanching, M., Tonsing, J. C., & Tonsing, K. N. (2017). Psy chological distress, coping and perceived social support in social work students. British Journal of Social Work, 47(7), 1999-2013. https://doi.org/10.1093/bjsw/bcw145

Wang, C. C. D., & Castañeda-Sound, C. (2008). The role of gen erational status, self-esteem, academic self-efficacy, and perceived social support in college students' psycholog ical well-being. Journal of college counseling, 11(2), 101-118. https://doi.org/10.1002/j.2161-1882.2008.tb00028.x

Wittenborn, A. K., Natamba, B. K., Rainey, M., Zlotnick, C., & Johnson, J. (2020). Suitability of the multidimensional scale of perceived social support as a measure of func tional social support among incarcerated adults with ma jor depressive disorder. Journal of community psychol ogy, 48(3), 960-976. https://doi.org/10.1002/jcop.22315.

Yang, M., Haydon, K. C., & Miller, M. J. (2013). The relationship between intergenerational cultural conflict and social sup port among Asian American and Asian international female college students and their parents. Asian American Journal of Psychology, 4(3), 193–200. https://doi.org/10.1037/a0030966

Yarrington, J. S., Lasser, J., Garcia, D., Vargas, J. H., Couto, D. D., Marafon, T., ... & Niles, A. N. (2021). Impact of the COVID-19 pandemic on mental health among 157,213 Ameri cans. Journal of Af ective Disorders, 286, 64-70. https://doi.org/10.1016/j.jad.2021.02.056

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support.

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Audrey Eady, MA, MHC-LP, graduated Summa Cum Laude from the University at Albany with a Bachelor's degree in Psychology and Sociology in 2021. As a research assistant, Ms. Eady completed her research at the Cognition and Language Laboratory. She obtained her Master's in Mental Health Counseling at Baruch College in 2023. She now works in Tribeca, New York, as a private practice therapist guiding children, adults, and couples in their therapeutic process. With an eclectic orientation based upon Psychodynamic, Mindfulness, and Trauma-Informed modalities, Audrey conducts therapy for folks who experience Anxiety, Depression, Trauma, ADHD, and Relational Issues.

Was there a particular experience that sparked your research interests?

During my freshman year, while I was completing my training for the University at Albany's Crisis Hotline, Dr. Jeanette Altarriba, the Director of the Cognition and Language Lab did a presentation on undergrad research, I was instantly drawn to the work done in her laboratory. The remainder of my time in Albany was spent under the guidance of Dr. Jeanette Altarriba and the Lab Research Supervisor, Dr. Allison Wilck. Continuing the publication process with them has been such a lovely experience to continuing collaboration as they have shown by example the strength and representation of women in continuing education and the impact of the resulting research. I am forever indebted and grateful for their guidance and mentorship. In the lab, I found myself curious about memory and the impact of the environment on encoding. This research reflects that curiosity while incorporating the observations of my clinical work.

Who has been the most influential person in your life?

It's impossible to pick one. My loving parents have been the most influential people in my life, actively leading by example the benefits of a strong work ethic, intentional rest, gratitude, and unwavering support of any aspiration. My siblings created an environment filled with laughter and friendship that has lasted into our adult lives. My dear friends have influenced me to appreciate life and the invisible strings that tie us together. I would not be the person I am today without the community of people behind me each step of the way.

What is your greatest accomplishment?

My greatest accomplishment is my higher education and journey toward licensure in Mental Health Counseling. To be a therapist is a unique privilege where it is so special to hold space and bear witness to the challenges and successes in my client's lives. To be a therapist is to be always learning and I am grateful to my supervisors and the field of therapy that values and depends on continuing education.

Where do you see yourself in 10 years?

In ten years, I hope to be continuing to assist and provide accessible and inclusive Mental Health Care with an emphasis on self-compassion. I would love the opportunity to teach other aspiring therapists using the knowledge and experience I have gained over the last ten years.

Hey Siri, What's That Sound? The Influence of Emotional Audio on Memory

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Acknowledgments

The authors would like to thank members of the Cognition and Language Laboratory for their general support throughout this research process. No funding was received for this research.

Studies have shown that contextual information—including emotions—can influence perceptions of ambiguous stimuli. However, less is known about the impact of emotional sounds on the processing of contextless, ambiguous images that do not inherently contain an emotional connotation (e.g., pleasant, unpleasant). In line with the emotional advantage framework, we hypothesize that emotional noises will sway the interpretation of ambiguous images to align in effect, increasing memory for the images. In the current study, everyday audio clips containing a positive (e.g., baby laughing, crowd cheering) or neutral (e.g., typewriter tapping, TV static) valence were paired with images of inkblots to test for changes in subjective experience during the study phase followed by a surprise (Experiment 1) or an expected (Experiment 2) memory test for the inkblot images. Results indicate that emotional sounds enhance the likeability of ambiguous images only if the sounds are presented during an intentional study session (Experiment 2). However, across both experiments, recognition memory for the images was hindered by the presence of audio, regardless of valence. These findings suggest that the robustness of the emotion processing advantage should be considered for task relevance of the emotion in question and the extent of multi-sensory engagement employed. Implications for student learning habits (e.g., listening to music while studying) and generating interest in learning material are discussed.

Keywords: emotion, audio, memory, ambiguous images, incidental encodingperceived social support

Hey Siri, What's That Sound? The influence of Emotional Audio on Memory

Emotions serve to enrich communication and our perceptions of the environment. Our subconscious mind is constantly exposed to background noise, which impacts our cognitive load, or the amount of information that can be attended to at one time. As human cognition has a finite amount of information that can be processed at once, it is not surprising that our ability to remember information is also limited (Banbury et al., 2001). Do any of those background sounds have an impact on how we remember moments, and how much we can remember? For example, when a victim of a forest fire hears a helicopter overhead, would their reaction differ from someone who grew up near an airport and habitually tunes out such sounds?

Context plays a substantial role in determining how emotions are experienced (Greenaway et al., 2018), including the emotionality of sounds which incorporates factors such as pitch, rhythm, or harmonies. The auditory stimuli become emotional through personal experiences with these stimuli; the sound of an Ice Cream Truck may invoke childhood nostalgia, while the sounds of waves may be soothing to some or troublesome to others, depending on their personal experiences with being in or around water (Liuni et al., 2020). Indeed, auditory stimuli often fuel strong emotional responses (Bradley & Lang, 2000). Several studies have explored the influence of pleasing and dissonant music on altering preferences and memory. For instance, Jäncke (2008) reported that harmonic music enhanced both subjective feelings of positivity and memory retention. On the other hand, listening to dissonant harmonies resulted in an increase in self-reported negative emotions and decreased memory retention.

Despite the frequency with which auditory information

can alter our perceptions, less research has been devoted to the influence of everyday sounds (Bergman et al., 2016; Bradley & Lang, 1999; Sun et al., 2020). In the current experiments, we explored the role of everyday emotion-laden audio clips (e.g., baby laughing, car motor) on subjective perceptions of liking and memory for emotionally ambiguous images (i.e., inkblots).

The Emotional Advantage in Memory and Auditory Information

When emotion is discussed, it is typically described as containing two components: valence and arousal (Russell, 1980). Valence refers to the pleasantness of a stimulus, ranging from negative to positive. Arousal indicates intensity, ranging from low to high. For instance, 'happiness' is a positively-valenced, high-arousal emotion. Emotions falling intermittently on the valence dimension are considered 'neutral,' evoking neither a strong reaction nor a hedonic experience (e.g., okay, content). Research suggests that emotional information has a substantial influence over cognitive processes, including perception, learning, and problem-solving ('emotional enhancement'; Adelman & Estes, 2013; Leighland et al., 2004). Emotions can provide humans with imperative information that can be used to modify judgments and understand one's role in the environment. In fact, the emotional connotation of environmental stimuli has been reported to consume higher levels of attentional resources than nonemotional counterparts do (Schupp et al., 2007). This heightened attention is linked to increased confidence and vividness of emotionally charged memories, which can lead to greater levels of perceived learning (Pekrun, 1992). Such findings have been reported in both younger and older adults (Kensinger et al., 2007), and replicated across both short and long testing delays (Ferré, 2002).

Despite emotions leading to increased vivid learning potential, not all emotions show cohesive outcomes. When a person is feeling happy, interested, or other positive emotions, as opposed to feeling a negative emotion (e.g., anger, sadness), memory recall (Snefjella et al., 2020) and recognition (Grider & Malmberg, 2008) tend to be superior in the short-term (Levine & Burgess, 1997). In particular, the ability to recite a list of words was shown to decrease in participants after watching an anger-inducing video, as opposed to a happy-inducing video (Wang, 2020). Such a processing advantage may suggest that positive emotions aid in memory consolidation over negative emotions (Sharot & Yonelinas, 2008). Additionally, Van der Kolk (2014) suggests the accuracy of our memory largely depends on the level of arousal at the time of a positive or traumatic event. Depending on how emotional and influential the particular memory is, it is either integrated through a cohesive narrative or in traces of images, sounds, and physical sensations. That is, episodic memories, or memories about one's lived experiences are thought to be stored in a deconstructed fashion that allows for reinterpretation of an event during the recollection process. The sensory information from one's current environment that is present while recalling a memory can thus become integrated with memory, impacting how one feels about the experience. Similarly, experiencing an emotion or an environmental sensation—such as hearing a sound—can cue memory recollection and the reconstruction processes to occur. Thus, human memory can be triggered by environmental stimulation and altered by those same emotional cues.

Studies that support the existence of an emotion-processing advantage in memory have primarily utilized visual stimuli (e.g., words, videos, images) (Levine & Burgess, 1997). However, the mere presence of sound has also been shown to enhance memory encoding and retrieval. For instance, hearing a presenter's voice through surround sound speakers (i.e., spatial audio) while watching an online conference resulted in high memory accuracy and response confidence when matching a speaker to their statements (Baldis, 2001). Similarly, infants were shown to increase their rate of language recognition when words are read aloud or when phonetics are paired with visual cues (Houston & Juscyzk, 2003). Research on audio-visual learning often does not emphasize the emotional qualities of sound. Instead, they suggest that a multimodal encoding experience, regardless of valence, can enhance memory. If emotion is considered in the research design, it is generally reported that positively-valenced sounds—parallel to positively-valenced visuals—are prioritized in information processing (Leighland et al., 2004).

Both valenced stimuli and auditory stimuli tend to promote memory encoding and retrieval. However, these enhancements may be limited to emotional interpretation. For instance, Grinder and Malmberg (2008) found that more words are correctly recognized in a forced choice task when they are also rated as high in emotional intensity, as compared to emotionally neutral words. The discrimination analysis suggested that participants tended to select words that were not only emotional but also positive. This pattern implies that interpreting positive emotions in a stimulus can bias memory retrieval to be overactive. Similarly, engagement in positive emotions to promote memory retrieval has been used in music therapy as a technique to stimulate an affective experience through song (Campbell et al., 2019). Yet, the extent of a positive audio advantage—employing both an emotion processing advantage and multimodality—remains underexplored.

Emotionally Ambiguous Images

Whereas many stimuli encountered contain clear emotional connotations (e.g., a smile is a universal symbol for happiness), others are ambiguous and may be interpreted differently based on individual and situational context (e.g., identifying shapes in the clouds). Such ambiguous stimuli may be subject to emotional interpretation when presented in conjunction with effectively strong information. For instance, individuals subconsciously primed with faces displaying positive affect are more likely to perceive an emotionally ambiguous face as smiling (Siegel et al., 2018). Similarly, recent viewing of negative images led to participant ratings of neutral faces being more negative (Neta et al., 2011). Thus, it seems as though

how one interprets the emotionality of ambiguous visual stimuli can be directly influenced by the valence of simultaneously presented information.

In prior research, the influence of emotion on ambiguous object interpretation has largely centered on the visual modality. That is, word and image stimuli dominate the extant literature when it comes to the study of emotions (Schoth & Liossi, 2017). However, the human experience is multimodal. We have the capability to experience emotions not only through the eyes but through the ears, among other sensory systems. Music, conversations, and background noises can shape one's affective interpretation of a situation. For instance, hearing a movie soundtrack can increase one's heart rate (Ramos, 2015) and induce an emotional reaction in audience members (Muszynski et al., 2021) despite the visual performance being the intended focus of the viewer's attention. However, a few studies have explored how valenced auditory sounds influence the processing of visually ambiguous stimuli that are presented outside of a narrative context (Atias et al., 2019; Lavan et al., 2015; Rosenfeld & Steffens, 2019). This creates a unique opportunity to test the variables of incidental (Experiment 1) and intentional (Experiment 2) encoding of emotionally ambiguous objects paired alongside various background noises. Memory encoding intention can be manipulated with task instruction, whereby "incidental" encoding refers to vicarious memory for background or task-irrelevant information, and "intentional" encoding refers to memory for attention-focused, task-relevant information. From there, further investigation was prompted to see if the evidence would lean towards memory accuracy improving across valenced sound conditions.

The Current Experiment

Emotional information is prioritized in cognitive processing which can thereby enhance memory for emotionally-relevant information. Indeed, task-irrelevant emotions can even alter how neutral or ambiguous objects are interpreted. Yet, the influence of emotional sounds when processing ambiguous images has yet to be deeply explored. In two experiments, we explore how the presence of valenced (positive, neutral) sounds impacts the subjective interpretation of emotionally ambiguous images as well as subsequent incidental (Experiment 1) and intentional (Experiment 2) memory for the encoded stimuli. Incidental memory often looks like unplanned learning through exposure to one's environment or contextual situations, such as the background music in a movie. Alternatively, intentional memory involves a deliberate attempt to purposely commit the material to memory, such as when a student is studying for an upcoming exam. If the general presence of sound to produce a multimodal encoding experience enhances learning regardless of emotional content, then we expect to see equal memory performance across the sound conditions, both outperforming the no-sound condition. Furthermore, aligning with the emotion processing advantage, it is predicted that images paired with positively valenced sounds will receive an additional encoding benefit compared to images paired with neutral sounds or no sound, thus enhancing memory for those images.

Experiment 1

Methods

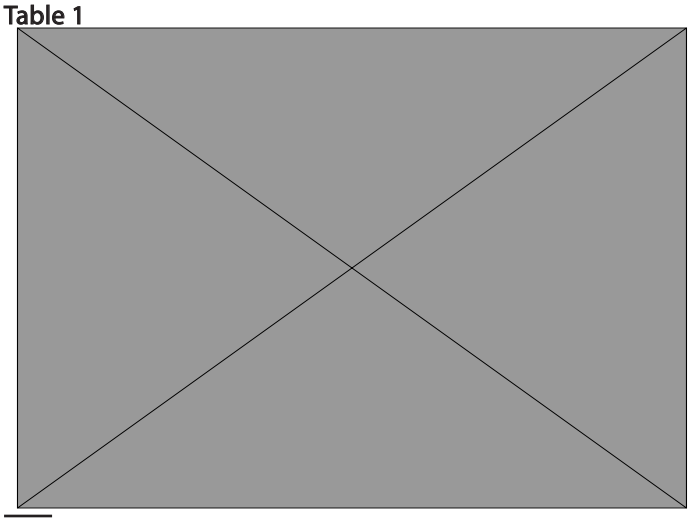
Participants

The G*Power program was used to determine the minimum number of participants needed to reach the lower limit statistical power level of .80. Predicting a moderate effect size of at least .25 and setting alpha to .05, a minimum of 36 participants was required. 354 undergraduate students (58% female) were recruited from psychology courses at a large, public institution in the Northeastern United States and were compensated with partial course credit. All participants were at least 18 years old (age: M = 18.63 years, SD = 1.33) and reported normal or corrected-to-normal hearing and vision. The self-report ethnicity was as follows: 54.80% White, 23.16% Black or African American, 7.91% Asian, and 14.12% Other.

Materials

Valenced Sounds. Prior to the main experiment, a pilot study was completed with a naïve sample (N = 20) to gather data on the perceived valence of everyday sounds. Thirty-seven sound files were gathered from YouTube and recordings from around the house. Participants rated each sound for valence, intensity (arousal), familiarity, and difficulty of identification in addition to naming each sound. The seven sound files rated most positive and the seven rated most neutral were selected for use in the main experiment (see Table 1).[1]

Table 1



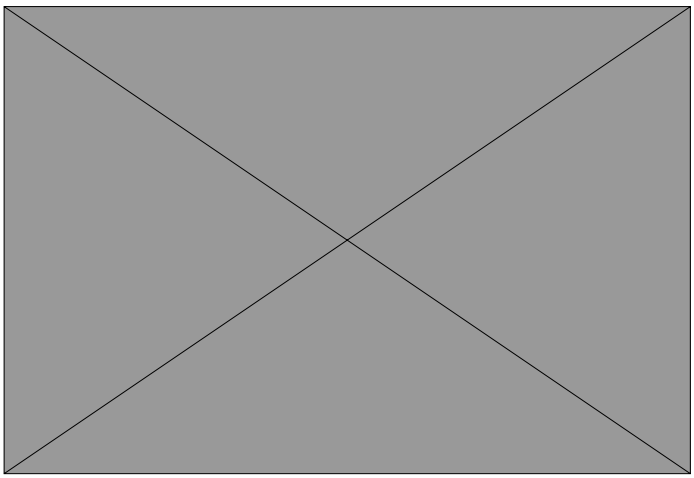
1 Sounds indicating a negative valence (below 3) received a large variance in scores therefore it was not clear that negative sounds were consistently being interpreted as such (M = 2.575, SD = 1.08). Future research would benefit from replicating the current methodology using sounds that reliably prompt a low valence interpretation.

Note. All scales ranged from 1 (low) to 7 (high). For valence, a score of 7 indicates positivity whereas 1 indicates negativity; 4 indicates neutrality.

Ambiguous Images. The Rorschach inkblot test is a classic psychometric tool that relies on individual interpretation of ambiguous shapes to gain insight into one's implicit desires and mental functioning (Bender, 2020). As the aim of the current work is to test how various sounds impact the interpretation and memory of emotionally ambiguous images, images mimicking those from the Rorschach test were utilized. Fourteen inkblot images obtained from an open-source internet search were collected (see Figure 1). Half of the images were randomly selected for use in the rating phase. All images were presented in the same fixed-random order across conditions. Each inkblot was rated for likeability on a 10-point Likert scale from 1 (Dislike) to 10 (Like).

Figure 1

Example of an Ambiguous Inkblot Image



Procedure

The main experiment included a one-way ANOVA design, with "audio valence" containing three levels—positive sound, neutral sound, and no sound—manipulated between subjects. All procedures were conducted via Qualtrics, with individual sessions lasting 14.29 minutes (SD = 8.74) on average. After providing consent, participants were randomly assigned to one of three sound conditions: positive sounds, neutral sounds, or no sound. The main experiment consisted of two phases: the image-rating phase and the testing phase. In the image-rating phase, participants listened to a 10-second sound clip in which the valence corresponded to the assigned condition. After each sound, an inkblot image appeared and was rated for likeability. This process was repeated for seven unique sound files and image pairings. After the seventh pairing, a 10-question addition math test was administered to create a period of memory retention (M = 2.36 minutes, SD = 1.19 minutes). This also served as an attention check; participants who did not attempt the math portion were removed from the analysis for data validation.

Immediately following the last math problem, the image-testing phase began in which fourteen inkblots were viewed, one at a time, in a random order. This included seven inkblots that were previously seen in the rating phrase and seven novel inkblots. As participants were not warned of the memory test, we presumed that incidental memory for the images and sounds was being tested. Participants were asked to identify if the image was previously rated (old) or not (new). For each image identified as "old," participants were prompted to recall and type the name of the sound that accompanied it during the rating phase. Following the testing phase, basic demographic information was collected. Finally, participants were debriefed and were compensated for their time. All procedures were approved by the university's institutional review board (IRB; approval code 20E211).

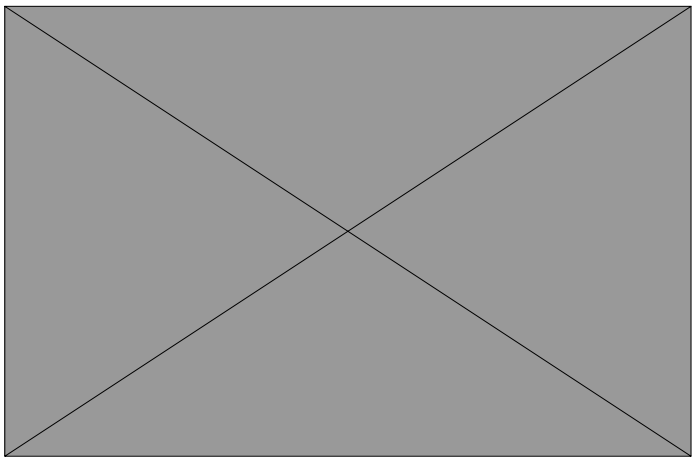
Results

Image Likeability Ratings

A between-subjects univariate analysis of variance (ANOVA) was completed to compare likeability ratings across sound conditions: neutral sounds (M = 4.86, SD = 2.30), positive sounds (M = 5.02, SD = 2.48), no sound (M = 4.87, SD = 2.36). The image number was entered as a random factor. Contrary to our prediction, no evidence was found to suggest a statistical difference in image likeability ratings across the three conditions, $F(2, 12.00) = .62$, $p = .55$, $p2 = .09$. However, as shown in Figure 2, image number revealed statistical significance indicating the inkblots were not all equally liked, $F(6, 12.01) = 18.37$, $p < .001$, $p2 = .90$. Thus, likeability ratings were retained as a covariate in the upcoming analyses.

Figure 2

Mean "Like" Ratings of Ambiguous Images across Conditions and Experiments



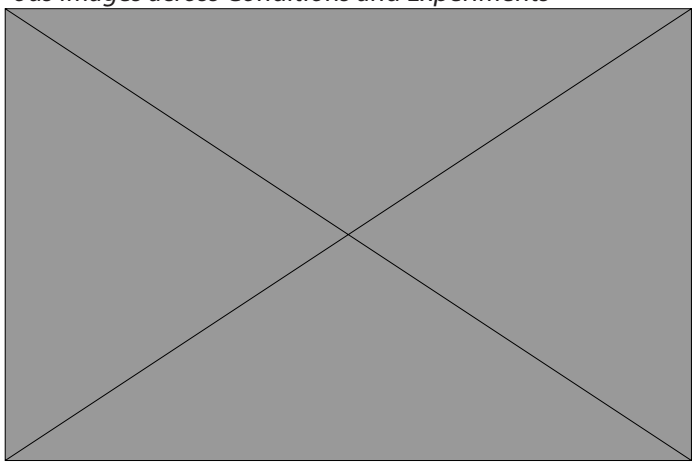
Note. Ratings ranged from 1 (Dislike) to 10 (Like). Error bars indicate +/- 1 S.E.

Recognition Memory for Images

Memory data were conditionalized by previously rated images. Accuracy was calculated by dividing the number of correctly indicated "old" images by the total number of "old" images (i.e., 7). A between-subjects one-way ANOVA was conducted to compare recognition memory accuracy across sound valence conditions (positive, neutral, and no sound). Image number was entered as a random factor and image likeability ratings were entered as a covariate. Contrary to our prediction, a significant effect of condition was found such that memory was superior for images paired with no sound (M = .83, SD = .38) as compared to a positive (M = .63, SD = .48) or neutral (M = .62, SD = .49) sounds, with no difference between the latter, $F(2, 12.00) = 8.75$, $p = .01$, $\eta p2 = .59$ as shown in Figure 3.

Figure 3

Mean Proportion Recognition Memory Accuracy of Ambiguous Images across Conditions and Experiments



*Note.*The covariate of rated "liking" appearing in the model was evaluated at the value of 4.91, in Experiment 1, and 4.96, in Experiment 2. Error bars indicate +/- 1 S.E.

Recall Memory for Valenced Sounds

In order to test for an emotional advantage, a separate between-subjects one-way ANOVA was conducted to analyze the influence of the two sound conditions (positive, neutral) on paired sound recall accuracy, with image number submitted as a random factor and image likeability ratings entered as a covariate. Data were conditionalized by items that were previously rated and for those in which a naming response was attempted. Contrary to our prediction, no pattern of statistical significance was revealed suggesting that there is no difference in recall for the positive (M = .13, SD = .34) and neutral (M = .13, SD = .34) sounds, $F (1, 6.90) = .01$, $p = .93$, $\eta p2 = .00$.

Experiment 2

Experiment 1 explored the influence of everyday positive and neutral sounds on subjective likeability perceptions of emotionally ambiguous images, as well as incidental memory, for those images. As suggested by the emotion processing advantage, it was expected that listening to a positively-valenced sound would increase subjective perceptions of the images as well as memory for the encoded information. Contrary to our predictions, it was found that the "no sound" condition led to the best recognition memory for the images. However, recall for the sounds was quite low—less than 15% accuracy regardless of whether the sounds paired with the images were positive or neutral in valence. The lack of benefit from the emotional information may be due to an absence of acknowledged relevancy of the sounds during their presentation. In Experiment 1, participants were unaware of the upcoming image recognition memory task and the sound recall task. Moreover, the rating task only asked participants to attend to the images. Therefore, the sounds may have been perceived as irrelevant and extraneous information.

To test the influence of seemingly task-irrelevant sounds—be it emotional or neutral in context—on deliberate encoding, Experiment 2 differed from Experiment 1 in that it employed an intentional memory task for the to-be-rated images. This design again explicitly required participants to attend to the images during the rating task, now with the added task of knowingly and effectively storing the information for later retrieval. As in Experiment 1, the presence (or absence) of valenced sounds remained seemingly task-irrelevant; any encoding and subsequent retrieval of the sounds was considered incidental learning. By using memory encoding during the rating task, the impact of emotional context, as created by simultaneously presented auditory information, on emotionally ambiguous encoding could be tested. Following the emotion processing advantage, it was predicted that the additionally present—albeit task-irrelevant—emotional information provided in the positive sound condition would enhance memory compared to the neutral sound condition.

Methods

Participants

Data were collected from a new naïve sample of 138 participants obtained from the same pool as Experiment 1 (55.80% female; age: M = 18.95 years, SD = 0.96). Self-report ethnicity was as follows: 52.17% White, 20.29% Black or African American, 13.04% Asian, and 14.50% Other.

Measures and Procedure

The same materials and protocol used in Experiment 1 were utilized in Experiment 2 with one key difference. As in Experiment 1, participants heard positive sounds, neutral sounds, or no sound prior to viewing inkblot images and rating each for likeability. Unlike in Experiment 1, participants were explicitly instructed to memorize the images for a later memory

test, thus creating an intentional learning situation for the inkblots. The instruction read, "Your task is to memorize the IMAGES for a later memory test." After rating each image, the recognition memory test was presented. On average, the experiment took 13.74 minutes (SD = 4.30) to complete.

As in Experiment 1, "audio valence" was manipulated between subjects on three levels: positive sounds, neutral sounds, and no sound. As only the image received a direct instruction, we are able to test for intentional memory recall for the images, and any incidental memory impacts that the positive or neutral sounds may have on encoding, as compared to the no sound condition.

Results

Image Likeability Ratings

Supporting our prediction, a between-subjects univariate analysis of variance (ANOVA) indicated that the valence condition did influence the likeability ratings of the abstract images, $F(2, 12.00) = 5.97$, $p = .02$, $p2 = .50$. Specifically, images paired with positive sounds ($M = 5.29$, $SD = 2.26$) received higher likeability ratings than did images paired with no sound ($M = 4.76$, $SD = 2.49$), and equivalent to those with neutral sounds ($M = 4.90$, $SD = 2.36$). As shown in Figure 2, image number revealed statistical significance indicating the inkblots were not all equally liked, $F(6, 12.70) = 13.74$, $p < .001$, $p2 = .87$.

Recognition Memory for Images

Replicating Experiment 1, a significant between-subjects one-way ANOVA revealed an effect of a valence condition such that memory was greatest for images paired with no sound ($M = .84$, $SD = .38$) than positive sounds ($M = .76$, $SD = .50$), and lowest for images paired with neutral sounds ($M = .66$, $SD = .51$), $F(2, 12.04) = 4.66$, $p = .03$, $\eta p2 = .44$, as shown in Figure 3. This finding did not align with predictions of a multi-sensory processing benefit.

Recall Memory for Valenced Sounds

Replicating Experiment 1, a between-subjects one-way ANOVA did not evidence a difference in recall of sounds paired with abstract images, regardless of whether the sounds were positive ($M = .13$, $SD = .34$) or neutral ($M = .16$, $SD = .37$) in valence, $F(1, 8.22) = 1.09$, $p = .33$, $\eta p2 = .12$. This result shows no support for the prediction of an emotion processing advantage in memory.

Discussion

Experiment 1 evaluated participants' incidental memory for ambiguous images while listening to valenced sounds. The study aimed to understand the impact of valenced sounds on memory when participants were not explicitly instructed to memorize the images. The results indicated that the presence of positively- or neutrally-valenced sounds alongside ambiguous images did not significantly affect the likeability of the images. The evidence suggests that when task relevance is minimized or absent, emotional influences on environmental stimulation may be diminished.

Experiment 2 focused on intentional memory for ambiguous images while participants were exposed to valenced audio stimuli. Here, participants were explicitly instructed to memorize the ambiguous images, allowing researchers to examine the role of encoding intentionality and perceived task relevance in emotional influences on memory. Unlike in Experiment 1, Experiment 2 results revealed that abstract images paired with positively- or neutrally-valenced sounds were perceived as more likable. That is, when provided a motivation to attend to the images, extraneous environmental information (i.e., the sounds) appears to have adjusted perceptions of those images. It seems as though this pattern of findings underscores the importance of intentionality and perceived task relevance in modulating emotional effects on memory processes.

The current findings further support that learning context matters; extraneous emotional information can alter the enjoyment of studied information but may also hinder encoding success. The pattern of results parallels the learning literature suggesting that test scores improve when studied information directly connects to learning goals (Pu & Tse, 2014; Sussman et al., 2005; Draschkow et al., 2019).

Although a subjective benefit to one's learning experience—that is, personal liking—when encountering positive sounds was found, the emotional benefit does not appear to translate to memory performance. Although the rating experience was perceived as more pleasant in the positive condition, this did not equate to superior memory for the images or the sounds themselves. Therefore, the impact of emotional sounds may reside solely in the subjective experience of the encoding context, as opposed to cognitive performance. Indeed, across both experiments, the "no sound" condition led to the greatest image recognition. Because both the emotionally positive and neutral valence conditions resulted in poorer memory performance, the results are taken to suggest that the presence of auditory information, in general, disrupted encoding. Engaging an additional sensory system (visual and auditory) may have split attention and thus undermined the encoding effort required to be successful on this task (Makovski & Jang, 2007). Thus, the encoding of the images was disrupted in both sound conditions and memory recollection suffered. Additional research is needed to delineate if the lack of encoding aid was a result of the sounds being task-irrelevant, the emotional sounds disrupting cognitive resources, or an alternative explanation.

The lack of influence of emotional sounds on memory performance may be further explained by individual differences. Experiment 1 intended to explore how accidental exposure to emotional sounds influences memory for ambiguous images, but it overlooked the possibility of differences in participants' attention or cognitive involvement with the stimuli. Since participants were not specifically instructed to pay

attention to or disregard the sounds, variations in how individuals allocated their attention could have affected the observed memory effects. Experiment 2's explicit instruction for participants to remember the ambiguous images increased the cognitive effort required, potentially altering how they perceived and encoded the valenced audio stimuli. Participants being aware of an impending memory test might have caused them to pay more attention to the valenced audio, resulting in stronger emotional impacts on memory compared to everyday situations.

While the current study offers valuable insights into the impact of valenced audio stimuli on memory for ambiguous images, several limitations warrant consideration. The participants were all college students; these data may not represent the broader population, making it important to avoid generalizing the results to other groups. Additionally, the use of ambiguous images and valenced audio stimuli in a laboratory setting may not fully reflect the real-world memory processes. Participants' reactions to ambiguous images in a controlled environment may differ from their responses to real-life stimuli which Experiment 1 tried to mimic by testing incidental memory. Studies on working memory have underscored its pivotal role in cognitive processing and its association with various cognitive functions, including attention, reasoning, and decision-making (Baddeley, 2003). There may be limits to participants' attention span, how the participants encoded the information presented visually versus valenced auditory stimuli, and whether or not it was temporarily stored. Hence, the study's concentration on auditory stimuli overlooks the multi-sensory aspects typical of everyday life experiences. Furthermore, the study may not sufficiently reflect the intricacies of memory processes. Tulving and Thomson's (1973) encoding specificity principle suggests that retrieval cues are most effective when they match the cues present during encoding. For instance, when a student listens to a distinct playlist while studying, they may struggle to retrieve the information they studied when they are unable to listen to the same music during an exam.

Given the nearly infinite amount of information present during any given waking moment, the current findings provide insight into the limits of everyday perception. Consider the motivation to encode and retain multi-modal stimuli: a combination of encoding cues often enhances the learning of studied material. Indeed, integrating emotional information, including visual and auditory stimuli, can improve recognition rates of previously encountered images (Paulmann & Pell, 2011). However, the present evidence revealed superior memory in the uni-sensory conditions, when the visual image was presented absent of auditory accompaniment. The abstract images did not contain a uniform or inherent emotional interpretation, as evidenced by the differing patterns of likeability across valence conditions. Therefore, it is suggested that multi-sensory information may require emotional congruence to obtain a benefit (Campbell et al., 2019; Grider & Malmberg, 2008). Such findings relate to situations focused on accurate memory reinstatement, for instance, during therapy sessions or eyewitness testimony (e.g., Cognitive Interview Technique: Fisher & Geiselman, 1992).

An implication of the current study relates to students' study habits. The detrimental impact of background music and conversations on working memory is well-documented (irrelevant speech effect: Colle & Welsh, 1976). Yet, it is not uncommon for students to simultaneously listen to music or watch television while attempting to study course material. The reported evidence supports the notion that the mere presence of auditory information disrupted the processing of the visual images, as compared to the no sound condition. Thus, students' performance may suffer from multitasking during study sessions due to interference effects prompted by the processing of multiple streams of information (e.g., visual and audio). As the current experiments utilized pictures to be memorized, future studies may use alternative stimuli such as text-based passages (emotional in nature and otherwise) to test the limits of impact from extraneous environmental sounds on learning efficiency.

Although memory and task performance suffers, the metacognitive judgments of liking suggest a benefit to the presence of irrelevant environmental audio while engaging in a primary task. Studies show that students have better learning outcomes when activities, assessments, and environments promote interest and enthusiasm for the topic (e.g., Ainley et al., 2002; König, 2020). Indeed, the presence of positive sound clips improved the self-reported experience of viewing abstract images (Experiment 2). Additional research is warranted to determine the extent to which a subjective benefit can impact learning motivation and success, particularly when studying material that is emotionally incongruent or ambiguous.

Future research may also extend the understanding of sounds in learning to include negatively-valenced audio clips. The current research, as evidenced by the pilot study, supports the notion that individuals may assign different valence values to the same sound (for neurological considerations, see Bravo et al., 2017). The inclusion of negatively valenced sounds in an experimental design necessitates careful consideration for the increased potential of triggering participants adversely. For example, a person hearing a negatively associated sound outside of a therapeutically controlled environment can become a catalyst to panic, anxiety, or episodes associated with post-traumatic stress disorder (Streb et al., 2017). As in all experiments, careful consideration should be given to ensure ethical and proper research designs for future studies seeking to incorporate the full range of emotions.

Conclusion

In the current study, everyday audio clips containing either a positive or neutral valence were paired with abstract images. Using both an incidental (Experiment 1) and intentional (Experiment 2) memory task, the presence of sound while rating images decreased later recognition of those images as compared

to the "no sound" conditions. The contribution of emotional audio during the study resulted in the increased enjoyment of abstract images. Thus, positive emotional connotations of task-peripheral information (i.e., audio clips present during an image rating task) were shown to enhance metacognitive judgments while simultaneously decreasing task-related cognitive performance. Designing broader studies with these data can include steps towards trauma treatment as our brain reacts strongly to trauma and emotional audio triggers. When a person experiences a traumatic event, the left hemisphere of our cortex goes "offline," making time feel as if it is standing still (Levy et al., 2024). The left hemisphere acts as "The Time Keeper," giving individuals the ability to speak and understand language in addition to executive functioning skills such as decision-making, managing emotions, and forming strategies. This means the right hemisphere's cortex becomes hyper-alert to non-verbal cues and sensory memories (emotional audio and visuals). Clinicians suggest this happens unconsciously and automatically resulting in the Fight, Flight, or Freeze response that is commonly activated during a traumatic event (van der Kolk, 2014). The data gathered in the current study can serve as a precursor for developing methods to reintegrate Top-Down Processing, which involves addressing the incident through talk therapy, versus Bottom-Up Processing, which involves engaging the body through activities such as meditation, dancing, breath work, yoga, and exercise, by including positive emotional sensory input into the recovery process.

Future directions of the current research may include expanding the participant pool to other age groups, educational backgrounds, and cultural contexts to better generalize to a broader population. Moreover, exploring working memory and its impact on cognitive functions paired with how visual and valenced auditory stimuli are stored and retrieved on a longitudinal basis would enable researchers to track changes in memory performance over time.

Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest involving financial, personal relationships or positions of management, employment, stock ownership or equity interest, consultancies, or intentional misrepresentation of the content of this submission. This submission is not under review elsewhere and does not possess any pending or issued patents or copyrights.

References

Adelman, J. S., & Estes, Z. (2013). Emotion and memory: A recognition advantage for positive and negative words independent of arousal. Cognition, 129(3), 530–535. https://doi.org/10.1016/j.cognition.2013.08.014

Ainley, M., Hidi, S., & Berndorff, D. (2002). Interest, learning, and the psychological processes that mediate their relationship. Journal of Educational Psychology, 94(3), 545–561. https://doi.org/10.1037/0022-0663.94.3.545

Atias, D., Todorov, A., Liraz, S., Eidinger, A., Dror, I., Maymon, Y., & Aviezer, H. (2019). Loud and unclear: Intense real-life vocalizations during affective situations are perceptually ambiguous and contextually malleable. Journal of Experimental Psychology: General, 148(10), 1842– 1848. https://doi.org/10.1037/xge0000535

Baddeley, A. D. (2003). Working memory: Looking back and looking forward. Nature Reviews Neuroscience, 4(10), 829–839. Baldis, J. J. (2001). Effects of spatial audio on memory, comprehension, and preference during desktop conferences. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 3(1), 166–173. https://doi.org/10.1145/365024.365092

Banbury, S. P., Macken, W. J., Tremblay, S., & Jones, D. M. (2001). Auditory distraction and short-term memory: phenomena and practical implications. Human factors, 43(1), 12–29. https://doi.org/10.1518/001872001775992462

Bender, S. (2020). The Rorschach Test. In B. J. Carducci, C. S. Nave, J. S. Mio, & R. E. Riggio (Eds.), The Wiley encyclopedia of personality and individual differences: Measurement and assessment (pp. 367–376). Wiley Blackwell. https://doi.org/10.1002/9781119547167.ch131

Bergman, P., Västfjäll, D., Tajadura-Jiménez, A., & Asutay, E. (2016). Auditory-induced emotion mediates perceptual categorization of everyday sounds. Frontiers in Psychology, 7(1565), 1–6. https://doi.org/10.3389/fpsyg.2016.01565

Bradley, M. M., & Lang, P. J. (1999). International Affective Digitized Sounds (IADS): Stimuli, Instruction Manual and Affective Ratings. Technical Report No. B-2, The Center for Research in Psychophysiology, University of Florida, Gainesville, FL.

Bradley, M. M., & Lang, P. J. (2000). Affective reactions to acoustic stimuli. Psychophysiology, 37, 204–215. https://doi.org/10.1111/1469-8986.3720204

Bravo, F., Cross, I., Hawkins, S., Gonzalez, N., Docampo, J., Bruno, C., & Stamatakis, E. A. (2017). Neural mechanisms underlying valence inferences to sound: The role of the right angular gyrus. Neuropsychologia, 102, 144–162. https://doi.org/10.1016/j.neuropsychologia.2017.05.029

Campbell S., Frohlich D., Alm N., & Vaughan A. (2019). Sentimental audio memories: Exploring the emotion and meaning of everyday sounds. In R. Brankaert & W. IJssselsteijn (Eds.), Dementia Lab 2019, making design work: Engaging with dementia in context (pp. 73–81). Springer. https://doi.org/10.1007/978-3-030-33540-3_7

Colle, H. A., & Welsh, A. (1976). Acoustic masking in primary memory. Journal of Verbal Learning & Verbal Behavior, 15(1), 17–31. https://doi.org/10.1016/S0022-5371(76)90003-7

Draschkow, D., Reinecke, S., Cunningham, C. A., & Võ, M. L. H. (2019). The lower bounds of massive memory: Investigating

memory for object details after inciden
tal encoding. The Quarterly Journal of Experimental Psychology, 72(5), 1176–1182. https://doi.org/http://dx.doi.org/10.1177/1747021818783722

Ferré, P. (2002). Advantage for emotional words in immediate and delayed memory tasks: Could it be explained in terms of processing capacity? The Spanish Journal of Psychology, 5(2), 78–89. https://doi.org/http://dx.doi.org/10.1017/S1138741600005850

Fisher, R. P., & Geiselman, R. E. (1992). Memory-enhancing techniques for investigative interviewing: The cognitive interview. Charles C. Thomas.

Greenaway, K. H., Kalokerinos, E. K., & Williams, L. A. (2018). Context is everything (in emotion research). Social and Personality Psychology Compass, 12(6), e12393. https://doi.org/10.1111/spc3.12393

Grider, R. C., & Malmberg, K. J. (2008). Discriminating between changes in bias and changes in accuracy for recognition memory of emotional stimuli. Memory & Cognition, 36(5), 933–946. https://doi.org/http://dx.doi.org/10.3758/MC.36.5.933

Houston, D. M., & Jusczyk, P. W. (2003). Infants' long-term memory for the sound patterns of words and voices. Journal of Experimental Psychology: Human Perception and Performance, 29(6), 1143–1154. https://doi.org/http://dx.doi.org/10.1037/0096-1523.29.6.1143

Jäncke, L. (2008). Music, memory, and emotion. Journal of Biology, 7(21), 1–5. https://doi.org/10.1186/jbiol82

Kensinger, E. A., Garoff-Eaton, R. J., & Schacter, D. L. (2007). Effects of emotion on memory specificity: Memory trade-offs elicited by negative visually arousing stimuli. Journal of Memory and Language, 56(4), 575–591. https://doi.org/10.1016/j.jml.2006.05.004

König, L. (2020). Podcasts in higher education: Teacher enthusiasm increases students' excitement, interest, enjoyment, and learning motivation. Educational Studies, 47, 1–4. https://doi.org/10.1080/03055698.2019.1706040

Lavan, N., Lima, C. F., Harvey, H., Scott, S. K., & McGettigan, C. (2015). I thought that I heard you laughing: Contextual facial expressions modulate the perception of authentic laughter and crying. Cognition and Emotion, 29(5), 935–944. https://doi.org/10.1080/02699931.2014.957656

Leighland, L. A., Schulz, L. E., & Janowsky, J. S. (2004). Age related changes in emotional memory. Neurobiology of Aging, 25(8), 1117–1124. https://doi.org/http://dx.doi.org/10.1016/j.neurobiolaging.2003.10.015

Levine, L. J., & Burgess, S. L. (1997). Beyond general arousal: Effects of specific emotions on memory. Social Cognition, 15(3), 157–181. https://doi.org/http://dx.doi.org/10.1521/soco.1997.15.3.157

Levy, E., Herzog, D., Ryder, C. H., Grunstein, R., & Gidron, Y. (2024). Indirect exposure to atrocities and post-traumatic stress disorder symptoms among aid workers: Hemispheric lateralization matters. Journal of Clinical Medicine, 13(8), 2373-2383. https://doi.org/10.3390/jcm13082373

Liuni, M., Posnot, E., Bryant, G. A., & Aucouturier, J.J. (2020). Sound context modulates perceived vocal emotion. Behavioural Processes, 172, e104042 https://doi.org/10.1016/j.beproc.2020.104042

Makovski, T., Jiang, Y.V. (2007). Distributing versus focusing attention in visual short-term memory. Psychonomic Bulletin & Review, 14, 1072–1078. https://doi.org/10.3758/BF03193093

Muszynski, M., Tian, L., Lai, C., Moore, J. D., Kostoulas, T., Lombardo, P., Pun, T., & Chanel, G. (2019). Recognizing induced emotions of movie audiences from multimodal information. IEEE Transactions on Affective Computing, 12(1), 36-52. https://doi.org/10.1109/TAFFC.2019.2902091

Neta, M., Davis, F. C., & Whalen, P. J. (2011). Valence resolution of ambiguous facial expressions using an emotional oddball task. Emotion, 11(6), 1425–1433. https://doi.org/10.1037/a0022993

Paulmann, S., Pell, M.D. (2011). Is there an advantage for recognizing multi-modal emotional stimuli? Motivation and Emotion, 35, 192–201. https://doi.org/10.1007/s11031-011-9206-0

Pekrun, R. (1992). The impact of emotions on learning and achievement: Towards a theory of cognitive/motivational mediators. Applied Psychology, 41, 359–376. https://doi.org/10.1111/j.1464-0597.1992.tb00712.x

Pu, X., Tse, CS. (2014). The influence of intentional versus incidental retrieval practices on the role of recollection in test-enhanced learning. Cognitive Processing, 15, 55–64. https://doi.org/10.1007/s10339-013-0580-2

Ramos, M. (2015). The emotional experience of films: Does audio description make a difference? The Translator, 21(1), 68–94. https://doi.org/10.1080/13556509.2014.994853

Rosenfeld, N., & Steffens, J. (2019). Effects of audiovisual congruency on perceived emotions in film. Psychomusicology: Music, Mind, and Brain, 29(4), 200–208. https://doi.org/10.1037/pmu0000242

Russell, J. A. (1980). A circumplex model of affect. Journal of Personality and Social Psychology, 39(6), 1161–1178. https://doi.org/10.1037/h0077714

Schoth, D. E., & Liossi, C. (2017). A systematic review of experimental paradigms for exploring biased interpretation of ambiguous information with emotional and neutral associations. Frontiers in Psychology, 8(171), 1–20. https://doi.org/10.3389/fpsyg.2017.00171

Schupp, H. T., Markus, J., Weike, A. I., & Hamm, A. O. (2003). Emotional facilitation of sensory processing in the visual cortex. Psychological Science 14, 7–13. http://doi.org/10.1111/1467- 9280.01411

Sharot, T., & Yonelinas, A. P. (2008). Differential time-dependent effects of emotion on recollective experience and memory for contextual information. Cognition, 106(1), 538–547. http://dx.doi.org/10.1016/j.cognition.2007.03.002

Siegel, E. H., Wormwood, J. B., Quigley, K. S., & Barrett, L. F. (2018). Seeing what you feel: Affect drives visual perception of structurally neutral faces. Psychological Science,

29(4), 496–503. https://doi.org/10.1177/0956797617741718

Snefjella, B., Lana, N., & Kuperman, V. (2020). How emotion is learned: Semantic learning of novel words in emotional contexts. Journal of Memory and Language, 115(18), e104171. https://doi.org/http://dx.doi.org/10.1016/j.jml.2020.104171

Streb, M., Conway, M. A., & Michael, T. (2017). Conditioned responses to trauma reminders: How durable are they over time and does memory integration reduce them? Journal of Behavior Therapy and Experimental Psychiatry, 57, 88–95. https://doi.org/10.1016/j.jbtep.2017.04.005

Sun, J., Schwartz, H. A., Son, Y., Kern, M. L., & Vazire, S. (2020). The language of well-being: Tracking fluctuations in emotion experience through everyday speech. Journal of Personality and Social Psychology, 118(2), 364–387. https://doi.org/10.1037/pspp0000244

Sussman, E. S., Bregman, A. S., Wang, W. J., & Khan, F. J. (2005). Attentional modulation of electrophysiological activity in auditory cortex for unattended sounds within multi team auditory environments. Cognitive, Affective & Behavioral Neuroscience, 5(1), 93–110. https://doi.org/http://dx.doi.org/10.3758/CABN.5.1.93

Tulving, E., & Thomson, D. M. (1973). Encoding specificity and retrieval processes in episodic memory. Psychological Review, 80(5), 352–373.

Van der Kolk, B. (2014). The body keeps the score: Brain, mind, and body in the healing of trauma. Penguin Books.

Wang, B. (2020). Effect of post-encoding emotion on long-term memory: Modulation of emotion category and memory strength. Journal of General Psychology, 148(2), 192–218. https://doi.org/http://dx.doi.org/10.1080/00221309.2020.1769543