

**Playing Alone, Feeling Connected: Do Single-Player Video Games with
Social Surrogates Replenish Belonging After Social Rejection?**

by

Naoyuki Sunami

A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Psychology

Summer 2021

This work is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.

**Playing Alone, Feeling Connected: Do Single-Player Video Games with
Social Surrogates Replenish Belonging After Social Rejection?**

by

Naoyuki Sunami

Approved: _____

Tania Roth, Ph.D.

Chair of the Department of Psychological and Brain Sciences

Approved: _____

John A. Pelesko, Ph.D.

Dean of the College of Arts and Sciences

Approved: _____

Louis F. Rossi, Ph.D.

Vice Provost for Graduate and Professional Education and
Dean of the Graduate College

I certify that I have read this dissertation and that in my opinion it meets the academic and professional standard required by the University as a dissertation for the degree of Doctor of Philosophy.

Signed: _____

Lisa M. Jaremka, Ph.D.
Professor in charge of dissertation

I certify that I have read this dissertation and that in my opinion it meets the academic and professional standard required by the University as a dissertation for the degree of Doctor of Philosophy.

Signed: _____

Chad E. Forbes, Ph.D.
Member of dissertation committee

I certify that I have read this dissertation and that in my opinion it meets the academic and professional standard required by the University as a dissertation for the degree of Doctor of Philosophy.

Signed: _____

Julie A. Hubbard, Ph.D.
Member of dissertation committee

I certify that I have read this dissertation and that in my opinion it meets the academic and professional standard required by the University as a dissertation for the degree of Doctor of Philosophy.

Signed: _____

Jaye L. Derrick, Ph.D.
Member of dissertation committee

I certify that I have read this dissertation and that in my opinion it meets the academic and professional standard required by the University as a dissertation for the degree of Doctor of Philosophy.

Signed: _____

Jennifer T. Kubota, Ph.D.

Member of dissertation committee

ACKNOWLEDGEMENTS

My sincere thanks to Lisa Jaremka for chairing the dissertation committee and mentoring me throughout my degree. I also thank Chad Forbes, Julie Hubbard, Jaye Derrick, and Jeni Kubota for serving as committee members. Thanks also to all past and current members of the Jaremka lab—special thanks to Olga Lebed, Megan Nadzan, and Marcia Ellis. I also would like to thank my academic mentors pre-Ph.D., especially Lilian Gandeza, Tina Buse, Kris Kelly, Jonathan Hammersley.

American Psychological Foundation partly supported my dissertation. I thank the study participants for participating. I wrote my dissertation using freely available tools and resources. I thank the R Core Team and the authors of the R packages that I used. Also, I thank Yihui Xie for the book, "bookdown: Authoring Books and Technical Documents with R Markdown."

Writing a dissertation during a pandemic was never fun. But, I'm glad to find communities online for writing groups. Thanks to everyone I met at the Southeast Asian Social and Personality Psychologists writing group, the SPSP writing groups, and the UD Writing Hens. Special thanks to Darwin Guevarra, Jin Goh, Alexis Drain, Richa Gautam, Tzipporah Dang, Sally Baker, Fred Duong, Sam Adams, Jeremy Baker, Fernanda Andrade, and Aki Gormezano for the countless writing hours we shared.

Lastly, I thank my family members in the US, Japan, and the Philippines for their support. Especially, I'd like to thank Jazelle Maira Carillo for her tremendous help throughout my Ph.D. journey. Without her, any of this would not have been possible.

TABLE OF CONTENTS

| | |
|---|------------|
| LIST OF TABLES | ix |
| LIST OF FIGURES | x |
| ABSTRACT | xii |
| Chapter | |
| 1 OVERVIEW | 1 |
| 2 THE BI-DIMENSIONAL REJECTION TAXONOMY | 3 |
| 2.1 Existing Dimension: The Antisocial–Prosocial <i>x</i> -Axis | 7 |
| 2.1.1 Foundational Theories in the Rejection Literature | 8 |
| 2.1.2 Foundational Theories in the Close Relationships Literature . | 9 |
| 2.1.3 Defining Antisocial and Prosocial Responses | 10 |
| 2.2 A New Dimension: The Engaged–Disengaged <i>y</i> -Axis | 11 |
| 2.2.1 Foundational Theories | 11 |
| 2.2.2 Defining Engaged–Disengaged Responses to Rejection . . . | 13 |
| 2.3 Comparisons with Existing Theories | 15 |
| 2.4 Plotting Existing Studies in a Bi-Dimensional Space | 17 |
| 2.4.1 Responses in Quadrant 1: Engaged Antisocial Responses . . . | 19 |
| 2.4.2 Responses in Quadrant 2: Engaged Prosocial Responses . . . | 19 |
| 2.4.3 Responses in Quadrant 3: Disengaged Antisocial Responses .. | 19 |

| | | |
|-------------------|---|-----------|
| 2.4.4 | Responses in Quadrant 4: Disengaged Prosocial Responses | 20 |
| 2.5 | Using the Bi-Dimensional Rejection Taxonomy to Frame Existing Research | 22 |
| 2.5.1 | Factors Predicting Engaged versus Disengaged Antisocial Responses (Figure 2.3) | 22 |
| 2.5.2 | Factors Predicting Engaged versus Disengaged Prosocial Responses (Figure 2.4) | 26 |
| 2.6 | Using the Bi-Dimensional Rejection Taxonomy to Inspire New and More Accurate Hypotheses | 29 |
| 2.6.1 | Spontaneous Reactions to Rejection | 29 |
| 2.6.2 | Neurophysiological Markers | 31 |
| 2.6.3 | Applying the Bi-Dimensional Rejection Taxonomy to Other Threats to Belonging | 31 |
| 2.7 | Conclusion | 32 |
| REFERENCES | | 33 |
| APPENDIX | | 46 |
| A | DETAILED DESCRIPTION OF THE MEASURES INCLUDED IN STUDY 1 | 47 |
| A.1 | Study 1a: Mass Testing | 47 |
| A.2 | Study 1b: RAIV1 | 49 |
| A.3 | Study 1c: ARV1 | 55 |
| A.4 | Study 1d: EVV1 | 55 |
| A.5 | Study 1e: NPSV2 | 56 |

| | |
|--|-----------|
| B SUPPLEMENTARY FIGURES AND ANALYSES BY STUDY . | 59 |
| B.1 Study 1 | 59 |
| B.1.1 Study 1a | 59 |
| B.1.1.1 Correlations Table | 59 |
| B.1.2 Study 1b | 61 |
| B.1.2.1 Correlations Table | 61 |
| B.1.3 Study 1c (ARv1) | 63 |
| B.1.3.1 Correlations Table | 63 |
| B.1.3.2 Forestplot | 66 |
| B.1.3.3 Heart & Valence Manikins Across Time | 66 |
| B.1.4 Study 1d (EVv1) | 66 |
| B.1.4.1 Correlations Table | 66 |
| B.1.4.2 Forestplot | 69 |
| B.1.4.3 Heart Manikin Across Time | 69 |
| B.1.5 Study 1e (NPSv2) | 69 |
| B.1.5.1 Correlations Table | 69 |
| B.1.5.2 Forestplot | 73 |
| B.1.5.3 Heart Manikin Scores Across Time | 73 |
| B.2 Study 2 | 73 |
| B.2.1 Correlations Table | 73 |
| B.2.2 Bivariate Scatter Plot Matrix | 79 |
| B.2.3 World Cloud for Reported games | 79 |
| B.2.4 Main Analysis with Excluded Participants | 79 |
| B.2.5 Natural Language Processsing for Essays | 79 |

| | | |
|-------|--|----|
| B.2.6 | Exit Questions | 79 |
| B.3 | Study 3 | 84 |
| B.3.1 | Correlations Table | 84 |
| B.3.2 | Bivariate Scatter Matrix | 86 |
| C | INSTITUIONAL REVIEW BOARD APPROVAL LETTERS . . . | 88 |

LIST OF TABLES

| | | |
|-----|--|----|
| B.1 | Study 1a - Descriptive Statistics and Correlations among Variables | 60 |
| B.2 | Study 1b - Descriptive Statistics and Correlations among Variables | 62 |
| B.3 | Study 1c - Descriptive Statistics and Correlations among Variables | 65 |
| B.4 | Study 1d - Descriptive Statistics and Correlations among Variables | 68 |
| B.5 | Study 1e - Descriptive Statistics and Correlation Coefficients | 72 |
| B.6 | Bivariate Correlations Among the Measures in Study 2 | 78 |
| B.7 | Bivariate Correlations among the Measures in Study 3 | 85 |

LIST OF FIGURES

| | | |
|------|---|----|
| B.2 | Study 1c - Forestplot of Correlation Coefficients between the Measured Variabels with the Heart Manikin | 66 |
| B.3 | Study 1c - Heart Manikin Scores Across Time and Conditions | 67 |
| B.4 | Study 1d - Forestplot of Correlation Coefficients between the Measured Scores and the Heart Manikin | 70 |
| B.5 | Study 1d - Heart Manikin Across Time | 71 |
| B.6 | Study 1e - Forestplot of Correlations between the Measured Variables and the Heart Manikin Scores | 74 |
| B.7 | Study 1e - Heart Manikin Scores | 75 |
| B.8 | Need-Threat Scores Across Time and Condition | 76 |
| B.9 | Study 1e - Self-Esteem as a Possible Moderator for the Effect of Rejection on Need-Threat | 77 |
| B.10 | Matrix Plot for Study 2 Variables | 80 |
| B.11 | Word Cloud for Game Titles for the Social Surrogate Condition . . | 81 |
| B.12 | Word Cloud for Game Titles for the Non-Social Surrogate Condition | 82 |
| B.13 | Proportions of Words Used in Participants Essays Within Each Video Game Conditions. Words along the dashed line appeared equally in across social surrogacy and non-social surrogacy conditions. Words in the upper diagonal appeared more frequently in the social surrogacy condition than in the non-social surrogacy condition. Words in the lower diagnoal appeared more frequently in the non-social surrogacy condition. | 83 |
| B.14 | Study 2 - Lengths of Participant Answers to Exit Questions Across Question Order | 84 |
| B.15 | Study 3 - Bivariate Scatter Plot Matrix | 87 |

ABSTRACT

People have a fundamental need to belong—to be accepted, loved, and cared for. The COVID-19 pandemic has threatened people's sense of belonging; people had to isolate themselves from others due to the stay-at-home orders. At the same time in early 2020, people started to spend more time playing video games; sales and consumption of video games skyrocketed, breaking previous records worldwide. Existing theoretical perspectives suggest one possible reason for this popularity: video games, including single-player video games, may help people feel socially connected. For example, according to the bi-dimensional rejection taxonomy, solo gameplay is a disengaged prosocial response, an attempt to replenish belonging in a hands-off, indirect manner. Also, according to the social surrogacy hypothesis, solo gameplay can provide social surrogates, symbolic bonds that can replenish belonging. Players can form parasocial relationships (one-way psychological bonds) with a non-player character in the game; players can also immerse themselves in the social worlds and feel like a member of a collective presented in the video game. Although existing theories and qualitative evidence suggest that solo gameplay can benefit belonging, quantitative evidence is lacking to support this prediction. In this dissertation, I examined if solo gameplay could replenish belonging after social rejection. In Study 1, I validated the Heart Manikin—a single-item measure of state belonging, which I used in the subsequent studies. In Study 2, rejected participants recalled their time playing a video game with vs. without social surrogates. In Study 3, rejected participants played a custom video game that manipulates parasocial relationships and social worlds. Across studies, I found that rejected participants reported similar levels of belonging after being exposed to social surrogates in video games. The results move forward the discourse on

the bi-dimensional rejection taxonomy, the social surrogacy hypothesis, and the video games literature.

Chapter 1

OVERVIEW

People have a fundamental need to belong—to be accepted, loved, and cared for (Baumeister & Leary, 1995; Maslow, 1943). Being forced to stay at home during the COVID-19 pandemic, many people experienced threats to belonging: an experience of feeling rejected, excluded, and unloved. At the same time, more and more people bought and played video games. Worldwide spending and Google search interests on video games hit an all-time high for March, April, and May in 2020, coinciding with the stay-at-home orders in the US (Beresford, 2020; Shanley, 2020; SuperData Staff, 2020). Media reports have suggested that people play video games to cope with social isolation during the COVID-19 crisis (Baraniuk, 2020; Gregory, 2020; Langille et al., 2020; D. Lazarus, 2020). Existing research supports that playing video games with others online (e.g., in a multiplayer mode) can increase belonging (Kowert & Oldmeadow, 2015; Vella et al., 2015). However, people can also play alone in a single-player mode (solo play), and whether solo plays can increase belonging remains unknown. Theoretically, solo plays can help people feel socially connected through social surrogates: parasocial relationships with non-player characters and social worlds where players can immerse themselves and feel like a member of a collective in the game. This raises an empirical question: Can a player replenish their belonging even when they play alone themselves? I designed my dissertation to answer this question.

I structure my dissertation as follows. In Chapter 2, I present my published work on the bi-dimensional rejection taxonomy (Sunami et al., 2019) to highlight the need for more evidence on the disengaged-prosocial responses: indirect, and hands-off attempts that increase belonging. In Chapter 3, I suggest that playing a video

game in a single-player mode is an unexamined disengaged-prosocial response to social rejection. I draw from the social surrogacy hypothesis (Gabriel & Valenti, 2017b) and the video games literature to suggest that solo plays can fulfill belonging. In Chapter 4 (Study 1), I first validated the Heart Self-Assessment Manikin (Heart Manikin), a single-item pictorial measure of belonging that I used as a key outcome for Studies 2 and 3. In Chapter 4 (Study 2), I examined whether recalling a video game with vs. without social surrogates, would increase belonging following social rejection. In Chapter 5 (Study 3), I let participants play a custom-made, single-player role-playing game to examine whether parasocial relationships or social worlds replenish belonging after social rejection. In Chapter 6, I discuss the findings of my dissertation and future avenues for research.

Chapter 2

THE BI-DIMENSIONAL REJECTION TAXONOMY

This chapter has been published as, Sunami, N., Nadzan, M. A., & Jaremka, L. M. (2019). The bi-dimensional rejection taxonomy: Organizing responses to interpersonal rejection along antisocial–prosocial and engaged–disengaged dimensions. Social and Personality Psychology Compass. <https://doi.org/10.1111/spc3.12497>.

Abstract

Responses to interpersonal rejection vary widely in form and function. Existing theories of interpersonal rejection have exclusively focused on organizing these responses on a single antisocial–prosocial dimension. Accumulating evidence suggests a gap in this approach: variability in social responses to rejection cannot solely be explained by the antisocial–prosocial dimension alone. To fill this gap, we propose the bi-dimensional rejection taxonomy, consisting of the antisocial–prosocial *x*-axis and engaged-disengaged *y*-axis, a novel contribution to the literature. We demonstrate that both the *x*- and *y*-axes are necessary for understanding interpersonal responses to rejection and avoiding erroneous conclusions. We also show how this new framework allows researchers to generate more nuanced and accurate hypotheses about how people respond when rejected. We further demonstrate how existing research about individual differences and situational factors that predict responses to rejection can be viewed in a new light within the bi-dimensional rejection taxonomy. We conclude by suggesting how the taxonomy inspires innovative questions for future research.

The Bi-Dimensional Rejection Taxonomy:
Organizing Responses to Interpersonal Rejection along Antisocial–Prosocial and
Engaged–Disengaged Dimensions

Traveling with an incomplete map is not very efficient—a traveler may end up in the wrong place because they are unsure where they are going. This analogy can also be applied to scientific research—a researcher is likely to arrive at an incorrect conclusion because they are using an incomplete theoretical framework. In this paper, we suggest that the rejection literature is operating with an incomplete theoretical framework for understanding responses to interpersonal rejection. Existing theories have already advanced our understanding of how people respond to rejection, primarily focusing on a single antisocial–prosocial dimension. Although this dimension is important, we suggest that not all antisocial and prosocial responses are identical. To account for this unexplained variability, we incorporate a second dimension, the engaged–disengaged dimension, adopted from the coping literature (Carver & Connor-Smith, 2010; Dijkstra & Homan, 2016). Accordingly, we propose the bi-dimensional rejection taxonomy, consisting of an antisocial–prosocial *x*-axis and an engaged–disengaged *y*-axis (Figure 2.1). Adding this second dimension provides a more thorough theoretical framework for understanding responses to rejection, equipping researchers with a more complete map for generating new hypotheses.

Our new taxonomy benefits the rejection literature in three ways. First, it provides a unified map for researchers to organize belonging-relevant responses to interpersonal rejection. Without this map, researchers would solely rely on the antisocial–prosocial *x*-axis, leading to inaccurate conclusions about rejection-elicited responses, as highlighted throughout the paper. For example, if a researcher only assessed engaged prosocial responses to rejection, and rejected participants didn't preferentially display these responses, the researcher might erroneously conclude that rejection doesn't lead to prosocial responses at all. Using the bi-dimensional rejection taxonomy, we can see that rejected participants could still display prosocial behavior, but in a disengaged

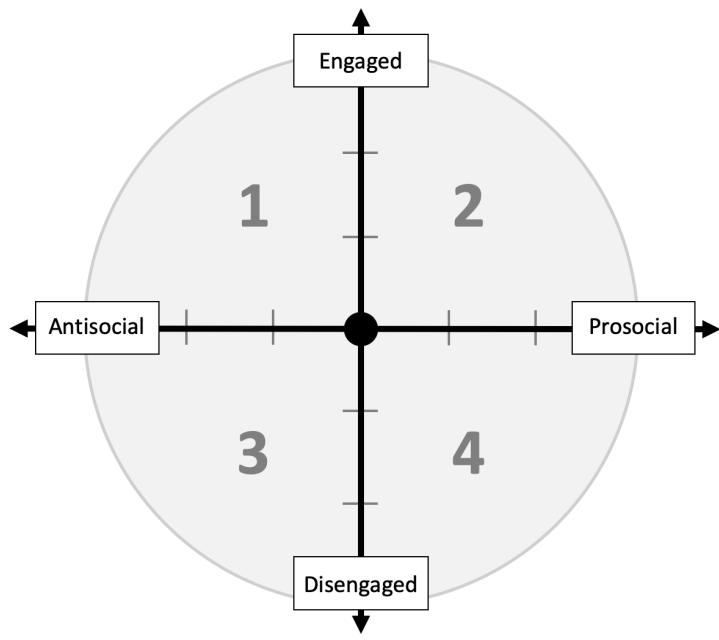


Figure 2.1: Conceptual figure of the bi-dimensional rejection taxonomy. The antisocial–prosocial x -axis refers to rejection responses that function to reduce (antisocial) or promote (prosocial) social connection. The engaged–disengaged y -axis represents engaged (direct, active, “hands-on,” approach-based) and disengaged (indirect, passive, “hands-off,” avoidance-based) attempts to cope with the stressor (the current or future need-threat elicited by the rejection experience). The numbers in the figure represent quadrants: Quadrant 1 (engaged antisocial responses), Quadrant 2 (engaged prosocial responses), Quadrant 3 (disengaged antisocial responses), and Quadrant 4 (disengaged prosocial responses).

manner. Thus, the engaged–disengaged *y*-axis of the bi-dimensional rejection taxonomy creates a cohesive framework, preventing researchers from reaching inaccurate conclusions about rejection-elicited responses.

Second, having a bi-dimensional framework allows researchers to generate more nuanced and accurate predictions about responses to rejection. In the past, researchers focused exclusively on how rejection affected antisocial and prosocial behavior (the *x*-axis) without differentiating types of behavior within these categories. As a result, existing hypotheses were limited in specificity. With the bi-dimensional rejection taxonomy, researchers can generate more nuanced and innovative hypotheses that incorporate both the antisocial–prosocial *x*-axis and the engaged–disengaged *y*-axis. For example, without the taxonomy, a researcher might hypothesize that both Situation A and Situation B lead to prosocial responses following rejection. However, with the new taxonomy, researchers can hypothesize that Situation A leads to engaged prosocial responses (e.g., reaching out to close others for connection), whereas Situation B leads to disengaged prosocial responses (e.g., watching their favorite TV program to feel socially connected). This hypothesis highlights potential differences between Situation A and B that would not be apparent without the taxonomy. Thus, the taxonomy arms researchers with a comprehensive framework of potential response options. Researchers can then use existing theoretical and empirical work to generate more nuanced and accurate hypotheses.

Third, the bi-dimensional rejection taxonomy highlights types of responses that are understudied in the rejection literature. As we discuss later, the bulk of rejection research has focused on engaged antisocial and prosocial responses. Using the lens of the bi-dimensional rejection taxonomy, we can see that many disengaged responses are yet to be examined in the context of rejection, highlighting the need for further research.

In proposing the taxonomy, we rely on existing work demonstrating that self-protective and belonging needs are fundamental to human nature, and that interpersonal rejection threatens these needs, motivating behavioral responses (Baumeister & Leary, 1995; Maslow, 1943; Murray et al., 2008a; Richman & Leary, 2009; Williams, 2009). Throughout this paper, we use interpersonal rejection as an overarching phrase that encompasses threats to belonging, including social exclusion, social rejection, ostracism, and relational devaluation—referring to experiences when a person feels like they aren’t loved, cared for, or accepted (Leary et al., 1995).¹

We exclusively focus on responses to rejection that are purposeful and voluntary (in contrast to automatic and involuntary responses) since our goal is to describe how people cope with rejection. This focus is consistent with the coping literature (on which the *y*-axis is heavily based) that defines coping as purposeful and conscious attempts to deal with the stressor (Connor-Smith et al., 2000). Automatic or involuntary responses (e.g., attentional bias to smiling faces) are outside the scope of the taxonomy and thus outside the scope of this paper.

We divide the current paper into two parts. In the first half, we review previous research supporting the antisocial–prosocial *x*-axis and introduce a novel engaged–disengaged *y*-axis. In the second half, we highlight how the taxonomy allows researchers to see existing published work through a new lens and discuss new directions for future research.

2.1 Existing Dimension: The Antisocial–Prosocial *x*-Axis

In this section, we review existing empirical and theoretical literature supporting the antisocial–prosocial *x*-axis. This dimension has been discussed extensively elsewhere

¹ While being denied a desired opportunity (e.g., employment, publication, etc.) is commonly referred to as rejection in lay terms, those types of experiences are outside the scope of this paper because they are not forms of interpersonal rejection; they do not convey to a person that they are uncared for or unloved. Similarly, intergroup rejection (a group excluded by a group) is outside the scope of this paper.

(e.g., Murray et al., 2006; Richman & Leary, 2009; Williams, 2009). Accordingly, we briefly highlight relevant work on interpersonal rejection and close relationships to support our use of the antisocial-prosocial *x*-axis. We discuss the novel engaged-disengaged *y*-axis in the next section.

2.1.1 Foundational Theories in the Rejection Literature

The antisocial–prosocial *x*-axis of the bi-dimensional rejection taxonomy stems from prior empirical research demonstrating that rejection sometimes leads to anti-social behavior and, at other times, prosocial behavior (DeWall et al., 2009, 2010a; Romero-Canyas et al., 2010; Twenge et al., 2001; Warburton et al., 2006a). For example, rejected participants blasted louder and longer noise to a stranger in one study [an antisocial response; Twenge et al. (2001)] and worked harder on a collective task in another study [a prosocial response; Williams & Sommer (1997)] compared with non-rejected participants. Rejection scholars have developed multiple theoretical frameworks for understanding these interpersonal responses to rejection that fall along the antisocial-prosocial *x*-axis. We refer readers to other theoretical papers for more extensive discussions of this dimension (Richman & Leary, 2009; Williams, 2009) and summarize relevant theories here to support the antisocial-prosocial *x*-axis of the bi-dimensional rejection taxonomy.

Many previous theories commonly highlight the existence of the antisocial–prosocial *x*-axis. For example, the multimotive model defines antisocial responses as those that function to diminish belonging whereas prosocial responses as those that function to enhance belonging (Richman & Leary, 2009). The need-threat model also identifies aggression (antisocial responses) and prosocial responses as primary categories of responses to cope with interpersonal rejection (Williams, 2009). Similarly, the reconnection hypothesis and the resource redistribution model both agree that responses to rejection range in function from antisocial to prosocial (DeWall & Richman, 2011; Shilling & Brown, 2015). These theories all agree that motives to self-protect

or regain control predict antisocial responses, and motives to obtain belonging predict prosocial responses (DeWall & Richman, 2011; Shilling & Brown, 2015; Williams, 2009). In sum, rejection theories strongly support the existence of the antisocial–prosocial dimension.

2.1.2 Foundational Theories in the Close Relationships Literature

Close relationships researchers also support the existence of an antisocial–prosocial *x*-axis. For instance, the investment model suggests that responses to relationship decline within a romantic relationship (a form of perceived rejection) can range from destructive (e.g., relationship-damaging responses such as leaving the relationship; similar to antisocial behavior) to constructive [e.g., relationship-repairing responses such as voicing a concern; similar to prosocial behavior; Rusbult et al. (1982a)]. Similarly, risk regulation theory suggests that couples' responses towards each other function to promote or damage the relationships (Murray et al., 2006), akin to antisocial and prosocial behavior within the romantic relationship.

The rapid marital coding system (RMICS) also supports the existence of the antisocial–prosocial *x*-axis. The RMICS describes behaviors that partners display towards each other on a continuum ranging from hostility to positivity (Heyman, 2004). On the left end of the continuum, hostile responses function to reduce connection between partners, similar to antisocial responses. On the right side of the continuum, positive responses function to increase connection between partners, similar to prosocial responses.

These close relationships theories strongly support the existence of the antisocial–prosocial *x*-axis. This dimension has been identified in different terms: destructive–constructive in the investment model (Rusbult et al., 1982a), self-protection–relationship promotion in risk regulation theory (Murray et al., 2006), and hostility–positivity in the RMICS (Heyman, 2004). However, all of the terms reflect the same underlying concept of behaviors that reduce (antisocial) or increase

(prosocial) connection with others. In addition, similar to the rejection literature, risk regulation theory argues that antisocial behaviors are motivated by self-protection concerns whereas prosocial responses are motivated by belonging needs (Murray et al., 2006).

2.1.3 Defining Antisocial and Prosocial Responses

As discussed above, multiple theories in the rejection and close relationships literatures strongly support an antisocial–prosocial dimension for understanding interpersonal responses to rejection. This consensus provides a strong foundation for the *x*-axis in the bi-dimensional rejection taxonomy. All theories consistently discuss how antisocial responses function to reduce social connection between the self and others, motivated by self-protection needs, and how prosocial responses function to promote social connection, motivated by belonging needs. Accordingly, we adopt these definitions in the bi-dimensional rejection taxonomy. Telling someone “I hate you” would thus be an antisocial response because it functions to reduce social connection with the other person. On the other hand, telling someone “I love you” would be a prosocial response because it functions to promote social connection.

Note that the word prosocial is sometimes used to denote altruistic behaviors that benefit the welfare of others—these behaviors may or may not function to promote connection with others (Batson & Powell, 2003). In this paper, we use the label prosocial to refer to behaviors that promote social connection with others, consistent with typical uses of the word in rejection research (Blackhart et al., 2006; Richman & Leary, 2009; Williams & Govan, 2005).

2.2 A New Dimension: The Engaged–Disengaged *y*-Axis

A close inspection of existing empirical work reveals that there is significant variability within antisocial and prosocial responses—reflecting heterogeneous strategies for responding to interpersonal rejection. For example, prior research demonstrated that rejection sometimes leads to direct and active attempts to connect with others [e.g., spending money to garner acceptance from others; Maner et al. (2007); Romero-Canyas et al. (2010)]. At other times, rejection leads to indirect and passive attempts to connect with others [e.g., experiencing nostalgia; Derrick et al. (2009)]. No existing theories of interpersonal rejection can distinguish between these varied responses—both types of responses are categorized as prosocial in the context of existing theories. The bi-dimensional rejection taxonomy makes a novel claim that the antisocial–prosocial *x*-axis captures only one dimension of responses, and that a new dimension is needed to fully understand responses to rejection. In this section, we first review foundational theories that suggest an additional possible dimension. Then, we define our new engaged–disengaged *y*-axis at the end of this section.

2.2.1 Foundational Theories

To understand the variation within antisocial and prosocial responses, we rely on theoretical and empirical work in the coping literature. This extensive literature describes the ways in which people cope with (i.e., voluntarily and purposefully respond to) stressors; thus, this literature provides a rich foundation for building our *y*-axis.

Coping researchers have proposed various ways to classify coping responses, including emotion-focused, problem-focused, proactive, and meaning-focused coping (Aspinwall & Taylor, 1997; R. S. Lazarus & Folkman, 1984; Skinner et al., 2003). Using factor analyses and theoretical discussions, researchers identified an engaged–disengaged dimension as the critical factor underlying the majority of coping responses (Carver & Connor-Smith, 2010; Compas et al., 1997; Connor-Smith et al., 2000; Dijkstra & Homan, 2016; Scheier et al., 1986; Skinner et al., 2003; Tobin et al., 1989).

According to this literature, engaged coping strategies are direct and active behaviors that confront the stressor with a “hands-on” approach. A person has used an engaged coping strategy when they act out their frustrations on others (e.g., aggression), seek social support, or behave in other active and direct ways (Carver & Connor-Smith, 2010; Dijkstra & Homann, 2016). On the other hand, disengaged coping strategies refer to indirect and passive behaviors that aim to avoid the stressor. Examples of disengaged coping are social withdrawal, denial, and wishful thinking (Carver & Connor-Smith, 2010).

We can easily apply the distinction between engaged and disengaged coping to understand how people respond to interpersonal rejection. In the context of rejection, the stressor that people are coping with is the threat to belonging and self-protection/control experienced by the rejected person. As noted earlier, these need-threats are well-documented consequences of experiencing rejection (Williams, 2009). The threats to belonging or self-protection/control can be present-oriented, when a person is trying to cope with the current need-threat, or it can be future-oriented, when a person is trying to pre-emptively cope with a potential future need-threat. In coping with those stressors, people can respond in ways that are more engaged versus disengaged. We adopt these ideas in defining the *y*-axis, as described in the next section.

Although no past theories have explicitly differentiated responses to rejection as engaged or disengaged, some researchers have implied the existence of this distinction by separating social withdrawal from other antisocial responses. For example, the multimotive model identifies social withdrawal as a subtype of antisocial (belonging-diminishing) responses that are separate from more overt antisocial responses such as aggression (Richman & Leary, 2009). Attachment theory also differentiated social withdrawal from other overt forms of behavior (e.g., aggression) as a response to prolonged rejection from an attachment figure (Bowlby, 2000; Horney, 1964). These theories both support the distinction proposed by the coping literature: disengaged

antisocial responses are different from engaged antisocial responses. As we describe later, a benefit of formally defining the engaged–disengaged *y*-axis is that it highlights additional forms of disengaged antisocial responses that have been neglected by existing theories.

Another theory that supports differentiating antisocial and prosocial responses is the investment model, a widely-used theoretical model in the romantic relationships literature. The investment model uses a two-dimensional space, characterizing how romantic partners behave when their romantic relationship is in decline (Rusbult et al., 1982b; Rusbult, 1987; Rusbult & Verette, 1991). Specifically, the investment model proposes the destructive–constructive dimension (similar to our antisocial–prosocial *x*-axis, as described previously) and the active–passive dimension (similar to, but also different from, our engaged–disengaged *y*-axis). Before discussing similarities and differences between the multimotive model, the investment model, and our new taxonomy, we first define the disengaged–engaged *y*-axis so that the reader has a complete understanding of these terms. Then, in the following section, we discuss how our model contributes over and above existing work in advancing our understanding of responses to interpersonal rejection.

2.2.2 Defining Engaged–Disengaged Responses to Rejection

Based on the literature reviewed above, we propose the engaged–disengaged *y*-axis that describes whether a response to rejection represents an engaged or disengaged attempt to cope with the stressor. Again, the stressor in the context of rejection is the current or future need-threat [i.e., the threat to self-protection/control or affiliation needs; Baumeister & Leary (1995); Williams (2009)]. We define engaged responses as direct and active attempts to deal with the stressor. They are “hands-on,” approach-based strategies to confront and face the stressor. An example of an engaged antisocial response is behaving aggressively towards one’s romantic partner, because exerting control over one’s partner actively and directly replenishes the sense

of self-protection/control thwarted by rejection. An example of an engaged prosocial response is seeking support from a loved one because this response actively and directly replenishes the sense of belonging thwarted by rejection (Murray et al., 2002, 2008b).

In contrast, we define disengaged responses as indirect and passive attempts to handle the stressor. They are “hands-off,” avoidance-based strategies to evade and divert from the stressor. These responses help to avoid threats to belonging or self-protection/control. An example of a disengaged antisocial response is social withdrawal, because withdrawing is a hands-off strategy that allows a person to avoid further rejection (and thus further threats to belonging or self-protection/control). An example of a disengaged prosocial response is relying on social surrogates (e.g., parasocial relationships)—such as watching one’s favorite TV show or passively browsing social media to obtain social connection. This qualifies as disengaged because social surrogates allow people to passively and indirectly replenish belonging while avoiding future rejection.

Importantly, the engaged-disengaged *y*-axis is defined by whether the response itself is engaged (direct, active, hands-on) or disengaged (indirect, passive, hands-off); it is not defined by the situation or environment in which it occurs. At the same time, recognizing the situation in which the response occurs is important because the situation limits possible response options. In a person’s day-to-day life, there is often a lot of flexibility in responding. For example, a rejected person can choose whether to seek social support (an engaged response) or watch their favorite TV show (a disengaged response) even if they are in the same situation (e.g., at home with their romantic partner on a Friday after work). This response flexibility is usually absent among lab studies where participants are given only one option to respond (e.g., participating in a noise blast task and deciding how much noise to blast, but not being given any other response options). Thus, the situation has the potential to constrain responses to be either engaged or disengaged, especially in laboratory studies. Using the engaged-disengaged *y*-axis, researchers can design studies that include diverse response

options, as we highlight in the future directions section towards the end of the paper.

Together with the antisocial–prosocial *x*-axis, the engaged–disengaged *y*-axis completes the bi-dimensional rejection taxonomy. These two dimensions both describe the function of a given response: whether a response functions to reduce or promote connection (*x*-axis) and whether a response functions as a direct, active, hands-on way of coping versus an indirect, passive, hands-off way of coping with the stressor (*y*-axis). In the next section, we discuss how the bi-dimensional rejection taxonomy compares with the existing theories of social behavior. Then, we provide examples of responses within each quadrant, demonstrating how the two dimensions are independent from each other.

2.3 Comparisons with Existing Theories

The bi-dimensional rejection taxonomy provides a novel lens through which to view responses to rejection, incorporating both the antisocial–prosocial and engaged–disengaged dimensions. How does the taxonomy compare with other theories? In this section, we discuss the advantages of the bi-dimensional rejection taxonomy over existing theories in the rejection and close relationships literatures.

Compared with existing rejection theories, the bi-dimensional rejection taxonomy provides a more nuanced and accurate depiction of responses to interpersonal rejection. The main advantage of the taxonomy is its power to differentiate engaged and disengaged responses, particularly prosocial responses. Past literature showed that rejected people respond in ways that qualify as disengaged and prosocial, such as thinking about one’s favorite TV program (e.g., Derrick et al., 2009) and that people can fulfill belonging in a variety of ways, including via social surrogates (e.g., a fictional character; Gabriel & Valenti, 2017). However, no existing theories have formally differentiated these types of prosocial responses from other more engaged responses (e.g., seeking social support from a loved one; Murray et al., 2008). The bi-dimensional

rejection taxonomy also differentiates disengaged antisocial responses. Among disengaged responses, social withdrawal is the only form of disengaged antisocial responses currently described by existing rejection theories, such as the multimotive model (Richman & Leary, 2009). With the current taxonomy, we can see that there are additional types of disengaged antisocial responses not described by the multimotive model or any other existing theory (e.g., passive aggressive behavior, as we describe in detail later). The bi-dimensional rejection taxonomy thus accounts for more responses than any other framework available in the rejection literature.

The bi-dimensional rejection taxonomy also offers advantages over the investment model in the close relationships literature. The investment model suggests that responses to romantic relationship decline range along a two-dimensional space: the destructive–constructive (i.e., how a response damages or nurtures the romantic relationship) and active–passive (i.e., how a response overtly or indirectly affects the romantic relationship) dimensions (Rusbult et al., 1982b). On the surface, the bi-dimensional rejection taxonomy seems similar to the investment model. However, the bi-dimensional rejection taxonomy is more advantageous than the investment model in considering broader sources of rejection and targets of the response. The investment model characterizes situations when the romantic relationship partner is the source of relationship decline, and it only characterizes responses towards an existing relationship partner (Rusbult et al., 1982b). The bi-dimensional rejection taxonomy captures threats to belonging from any source while also characterizing responses towards any target, not just the romantic partner. Finally, the engaged-disengaged *y*-axis of the bi-dimensional rejection taxonomy more accurately captures variation among antisocial and prosocial responses evident in the rejection literature. Whereas saying “I hate you” to one’s partner is a passive response (on the bottom half of the *y*-axis) according to the investment model (Rusbult et al., 1982b), this behavior would quality as engaged (on the top half of the *y*-axis) according to the bi-dimensional rejection taxonomy. The *y*-axis of the taxonomy is founded on decades of work in the coping literature (Carver

& Connor-Smith, 2010; Compas et al., 1997; Connor-Smith et al., 2000; Dijkstra & Homan, 2016; Scheier et al., 1986; Skinner et al., 2003; Tobin et al., 1989), and is also consistent with the way existing rejection research classifies responses (Richman & Leary, 2009).

2.4 Plotting Existing Studies in a Bi-Dimensional Space

In the previous sections, we reviewed literature supporting the antisocial–prosocial *x*-axis and introduced the engaged-disengaged *y*-axis to the rejection literature. We also compared this taxonomy with existing theories, and demonstrated that the taxonomy presents many advantages. In this section, we discuss select evidence demonstrating that interpersonal responses to rejection can be plotted in this two-dimensional space, broadly categorized into four quadrants: engaged antisocial responses (Quadrant 1), engaged prosocial responses (Quadrant 2), disengaged antisocial responses (Quadrant 3), and disengaged prosocial responses (Quadrant 4). We present a hypothetical exemplar for each dimension in 2.2 to illustrate the differences among quadrants and help the reader understand each quadrant. We also discuss existing research that falls into each quadrant in this section. Since no past studies included both of these new dimensions in their studies, we infer which quadrant a response falls into based on the properties of the response. We begin by reviewing existing empirical work that falls into Quadrant 1, and then move to Quadrants 2, 3, and 4.

The bi-dimensional rejection taxonomy highlights types of responses that have been understudied in the literature (e.g., passive aggressive behavior and nostalgia). To better illustrate these new kinds of responses, we discuss multiple examples for Quadrants 3 and 4 (i.e., disengaged antisocial and prosocial responses). Since past literature has extensively discussed responses in Quadrant 1 and Quadrant 2 (i.e., engaged antisocial and prosocial responses, as discussed above), we highlight only one representative example for these quadrants.

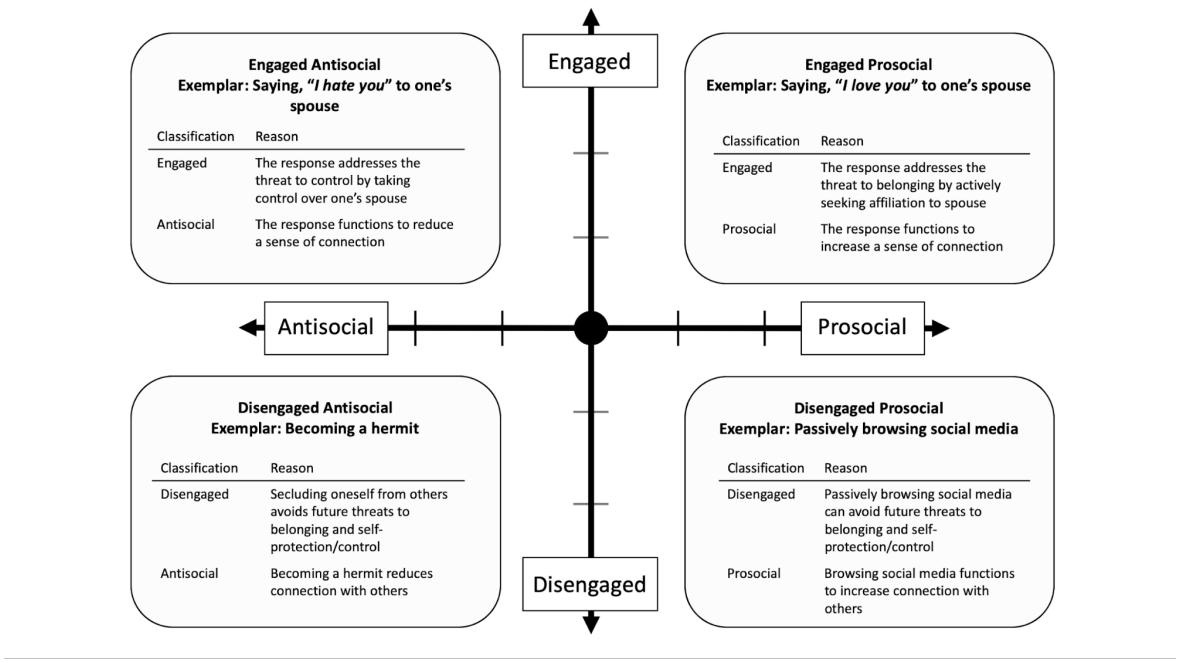


Figure 2.2: Summary of exemplar responses across quadrants. For each exemplar, we present reasons why we characterize them as antisocial versus prosocial and engaged versus disengaged.

2.4.1 Responses in Quadrant 1: Engaged Antisocial Responses

Past studies have demonstrated that rejected people respond in ways that qualify as engaged and antisocial. For example, rejected people allocated more hot sauce to a bystander who disliked spicy food, compared with non-rejected people (Ayduk et al., 2008; DeWall et al., 2010b). This response is antisocial because it functions to reduce connection with others (Warburton et al., 2006b; Williams, 2009). It also qualifies as engaged because it is a hands-on, approach-based and direct attempt to re-establish threatened self-protection/control needs by exercising dominance or control over others (Warburton et al., 2006b).

2.4.2 Responses in Quadrant 2: Engaged Prosocial Responses

Past studies showed that people seek their romantic partner's support when faced with potential rejection from that partner, especially among people with higher self-esteem (Murray et al., 2002, 2008b). Applying our proposed taxonomy, we suggest that this behavior qualifies as an engaged prosocial response because seeking social support from a romantic partner functions to increase social connection (a prosocial response) and actively confronts the current threat to belonging by directly seeking social connection.

2.4.3 Responses in Quadrant 3: Disengaged Antisocial Responses

One advantage of the taxonomy is that it highlights disengaged antisocial responses that are not accounted for by existing theories; we discuss several examples within this quadrant. Compared with non-rejected participants, rejected participants desired to withdraw from subsequent social interactions (Ren et al., 2015). This response functions to reduce social connection by avoiding further social contact. In light of our taxonomy, they are disengaged responses because they avoid future threats to belonging and self-protection/control by isolating oneself from others.

In addition to withdrawing socially, rejected people can structure their environment to prevent social encounters. For instance, rejected people preferred room configurations that hindered social interactions, presumably to avoid interacting with other people (Meagher & Marsh, 2017). This response is antisocial since doing so reduces opportunities for social connection, and the response is disengaged since it functions to evade future belonging threats.

Another example of a disengaged antisocial response is being passive-aggressive by not engaging in a behavior that can prevent harm to another person (Parrott & Giancola, 2007; South Richardson, 2014). For example, a rejected person might intentionally not speak up to defend their partner when the partner is insulted by others. This behavior is antisocial since doing so reduces connection with the partner. It is also a disengaged response since passive forms of aggression are “hands-off” and indirect means of dealing with the stressor.

People who feel socially rejected are more prone to stop caring for themselves by neglecting basic needs, a behavior called self-neglect, another form of a disengaged antisocial response. Self-neglect refers to inattention to personal hygiene and health (e.g., not showering or wearing deodorant), often accompanied by behaviors such as hoarding and refusal of help from others (Abrams et al., 2002; Dong et al., 2010). People who engage in self-neglecting behavior often report desires to avoid losing control (Band-Winterstein et al., 2012; Bozinovski, 2000). Thus, self-neglect is a disengaged antisocial response because neglecting one’s hygiene or habitat functions to reduce social connection with others, and it is an indirect and passive way to avoid future threat to self-protection/control needs.

2.4.4 Responses in Quadrant 4: Disengaged Prosocial Responses

Many disengaged prosocial responses involve the use of social surrogates—human or non-human targets with a psychological, but not physical, connection (Gabriel et al., 2016; Gabriel & Valenti, 2017a). People turn to social surrogates

to obtain belonging (Gabriel et al., 2016; Gabriel & Valenti, 2017a). For example, remembering a fight with a close other (i.e., perceived rejection) led people to think longer about their favorite TV program (vs. a non-favorite TV program), interpreted as a prosocial attempt to restore belonging (Derrick et al., 2009). The bi-dimensional rejection taxonomy regards this response as disengaged and prosocial, since relying on social surrogates helps people passively avoid future threats to belonging or control while simultaneously increasing perceived connection with others.

Another disengaged prosocial response is experiencing nostalgia—a sentimental yearning for the past and memories of social connections (Abeyta et al., 2015; Wildschut et al., 2010). Rejected participants experienced more nostalgia compared with accepted participants (Wildschut et al., 2010). Nostalgia is a disengaged prosocial response because it functions to increase perceived social connection with other people, but it does so in a hands-off way that allows people to avoid additional threats to belonging or self-control.

Taken together, responses to interpersonal rejection can be placed into the four quadrants of the bi-dimensional rejection taxonomy. Recognizing these quadrants is important in planning and conducting studies. For example, if a researcher provides engaged antisocial response options and finds that rejected participants do not behave more antisocially than included participants, they may incorrectly conclude that rejection does not lead to antisocial responses. This conclusion may be inaccurate because rejected participants may have instead used disengaged antisocial responses if they were provided with the option to do so. Researchers who incorporate the bi-dimensional rejection taxonomy can avoid faulty conclusions and reach a more calibrated interpretation of their findings.

2.5 Using the Bi-Dimensional Rejection Taxonomy to Frame Existing Research

The bi-dimensional rejection taxonomy provides researchers with a more nuanced and accurate understanding of responses to rejection. Previously, researchers were constrained to conclude that certain individual difference or situational factors caused either antisocial or prosocial behavior following rejection, without the appropriate language for specifying the type of antisocial or prosocial behavior being displayed. In this section, we view past research within the new lens of the taxonomy to look for individual differences and situational factors that appear to predict variation along the engaged–disengaged y -axis. In doing so, we make inferences about the y -axis post-hoc based on the available evidence, since the y -axis was not a part of the lexicon at the time those studies were conducted. We omit factors exclusively predicting variation along the antisocial–prosocial x -axis, such as need fortification (e.g., Williams, 2009), because they have been extensively discussed elsewhere (Leary et al., 2006; Richman & Leary, 2009; Williams, 2009). We divide this section into two parts. The first part focuses on variation in engaged and disengaged antisocial responses, and the second focuses on variation in engaged and disengaged prosocial responses.

2.5.1 Factors Predicting Engaged versus Disengaged Antisocial Responses (Figure 2.3)

Interpersonal Sensitivity to Rejection (Rejection Sensitivity and Self-Esteem). Some people worry about being rejected more than others. This tendency is present among people with higher rejection sensitivity and lower self-esteem (Downey & Feldman, 1996; Feldman & Downey, 1994; Leary et al., 1995). Although these constructs have important differences, they share significant conceptual underpinnings representing an overlapping construct, sensitivity to rejection (Crocker & Park, 2004; Park, 2010). For these reasons, we label this construct as *interpersonal sensitivity to rejection* and discuss the construct in reference to both indices.

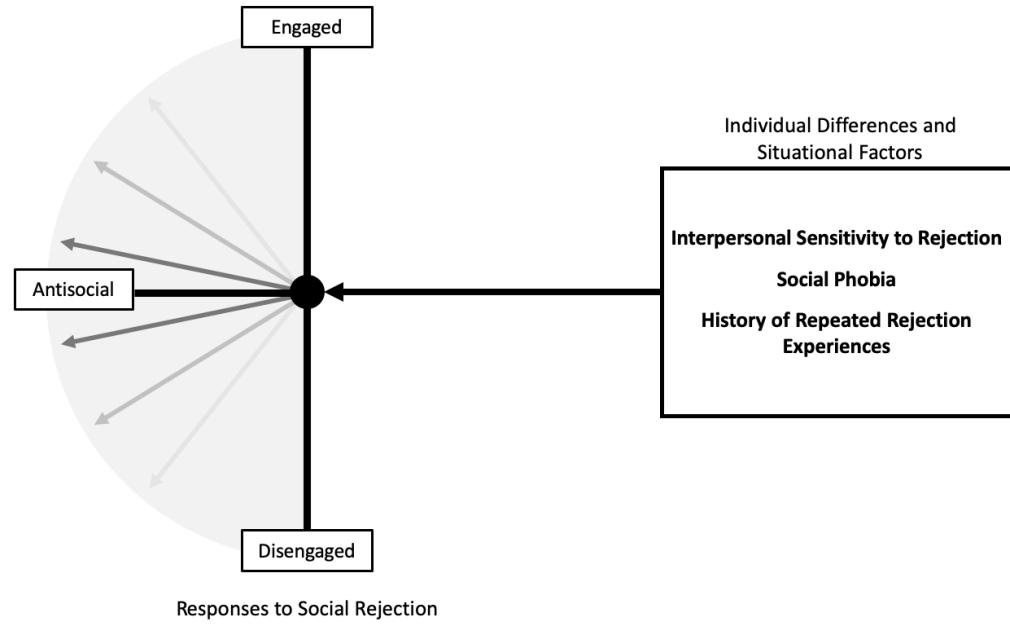


Figure 2.3: Representative individual differences and situational factors predicting engaged and disengaged antisocial responses. For illustrative purposes, only the antisocial hemisphere is depicted in this diagram. Higher interpersonal sensitivity to rejection (assessed via rejection sensitivity or low self-esteem) predicts engaged antisocial responses. Social phobia and history of repeated prior rejection experiences predict disengaged antisocial responses.

People with higher interpersonal sensitivity to rejection may be more likely to use engaged antisocial responses rather than disengaged antisocial responses (Figure 2.3). Specifically, past evidence has demonstrated a consistent link between higher interpersonal sensitivity and engaged antisocial behavior, such as aggression (Ayduk et al., 2008; Downey et al., 2000; Downey, Lebolt, et al., 1998; Downey, Freitas, et al., 1998; Murray et al., 2002). A review of the rejection sensitivity literature concludes that people high in rejection sensitivity respond to rejection in hostile and overtly aggressive ways (Romero-Canyas et al., 2010). Also, following a romantic relationship threat, people with lower self-esteem derogated their romantic partner as being more lazy and thoughtless relative to those with higher self-esteem (Murray et al., 2002). These engaged antisocial responses may be the result of a self-fulfilling prophecy—people fearfully expecting rejection can act in ways that provoke rejection from others, such as putting down their romantic partner during face-to-face interactions or perpetrating intimate partner violence (Downey et al., 2000; Downey, Freitas, et al., 1998).

Social Phobia. While the literature reviewed above consistently demonstrates that people with higher interpersonal sensitivity to rejection behave in engaged antisocial ways following rejection, related literature shows the opposite pattern. Specifically, people with a social phobia, an extreme form of interpersonal sensitivity to rejection, often behave in disengaged antisocial ways. For example, people with a social phobia often ruminate about social interactions without engaging in them and avoid interacting with people (and thus potential rejection) at all costs (Clark, 2001). In addition, people with a social phobia tend to avoid eye contact and emotionally distance themselves from others when experiencing interpersonal problems (Alden & Taylor, 2004). Thus, at least some forms of interpersonal sensitivity to rejection, in this case social phobia, actually predict disengaged rather than engaged antisocial responses.

These subtle differences highlight the importance of the bi-dimensional rejection taxonomy. Without the taxonomy, researchers would conclude that people who are highly sensitive to rejection (both in terms of rejection sensitivity, low self-esteem, and

social phobia) behave in antisocial ways following rejection. Using the bi-dimensional rejection taxonomy, we can see that the most extreme form of sensitivity to rejection (social phobia) leads to disengaged antisocial behavior, whereas other forms of sensitivity to rejection (e.g., low self-esteem) lead to engaged antisocial behavior. Noticing this subtle yet important difference in responses allows researchers to begin asking why a difference exists. For example, armed with the bi-dimensional rejection taxonomy, we could begin asking whether methodological differences could explain why interpersonal sensitivity led to engaged versus disengaged antisocial responses (e.g., did each study provide participants with both engaged and disengaged antisocial response options?). We could also begin wondering whether there is something qualitatively different between a more extreme, clinical interpersonal sensitivity versus those in the normative range. Without the bi-dimensional rejection taxonomy that differentiates disengaged and engaged antisocial responses, researchers wouldn't be able to ask these important questions. The taxonomy thus sheds light on an existing gap in our knowledge, spurring future research.

History of Repeated Rejection Experiences. Another related literature about repeated rejection experiences also highlights the importance of the bi-dimensional rejection taxonomy. People have different histories of being rejected—some have experienced rejection more often than others (e.g., students who were bullied vs. those who were not). A repeated history of rejection plays an important role in promoting antisocial responses to rejection, as highlighted by existing theories (Bowlby, 2000; Horney, 1991). For example, children who experience prolonged rejection from an attachment figure develop hostile views towards others, which then promotes expression of anger and aggression (Bowlby, 2000). In addition, a history of repeated rejection can foster a sensitivity to interpersonal rejection (London et al., 2007), which leads to antisocial responses. Thus, a researcher might conclude that both a repeated history of rejection and an interpersonal sensitivity to rejection lead to antisocial responses following rejection. This conclusion would be reasonable

prior to the existence of the bi-dimensional rejection taxonomy. However, a close inspection of the literature, viewed through the lens of the taxonomy, paints a different picture. Specifically, repeated rejection results in feelings of helplessness, unworthiness, submission, withdrawal, and avoidance of social interactions, described as “going into a little shell” (Riva et al., 2017; Williams, 2009; Zadro, 2004). Thus, people who experienced repeated rejection use more disengaged antisocial responses to rejection (e.g., withdrawing from others), rather than engaged antisocial responses (e.g., attacking others; Figure 2.3). Why would people with a history of repeated rejection behave in disengaged antisocial ways, whereas those with high rejection sensitivity behave in engaged antisocial ways—particularly because a history of rejection can lead to rejection sensitivity? The bi-dimensional rejection taxonomy offers a more nuanced understanding of antisocial responses, identifies this knowledge gap, and allows researchers to ask questions that would previously not have been possible. Although the taxonomy itself does not directly answer these questions, it provides researchers with the language needed to ask these questions in the first place.

2.5.2 Factors Predicting Engaged versus Disengaged Prosocial Responses (Figure 2.4)

Approach-Avoidance Tendency. People differ in their tendency to approach or avoid a social outcome. In general, people with approach-oriented tendencies actively pursue desirable outcomes, whereas people with avoidance-oriented tendencies avoid undesirable outcomes (Elliot et al., 2006). In the context of rejection, the desired outcome is re-establishing belonging, and the undesired outcome is experiencing further rejection. Ultimately, people must balance these two goals to maintain meaningful interpersonal relationships (e.g., Murray et al., 2006). Prior to the bi-dimensional rejection taxonomy, researchers would predict that avoidance-oriented people would not display prosocial responses following rejection, because the types of prosocial responses typically studied have risks of further rejection (e.g., actively seeking acceptance from

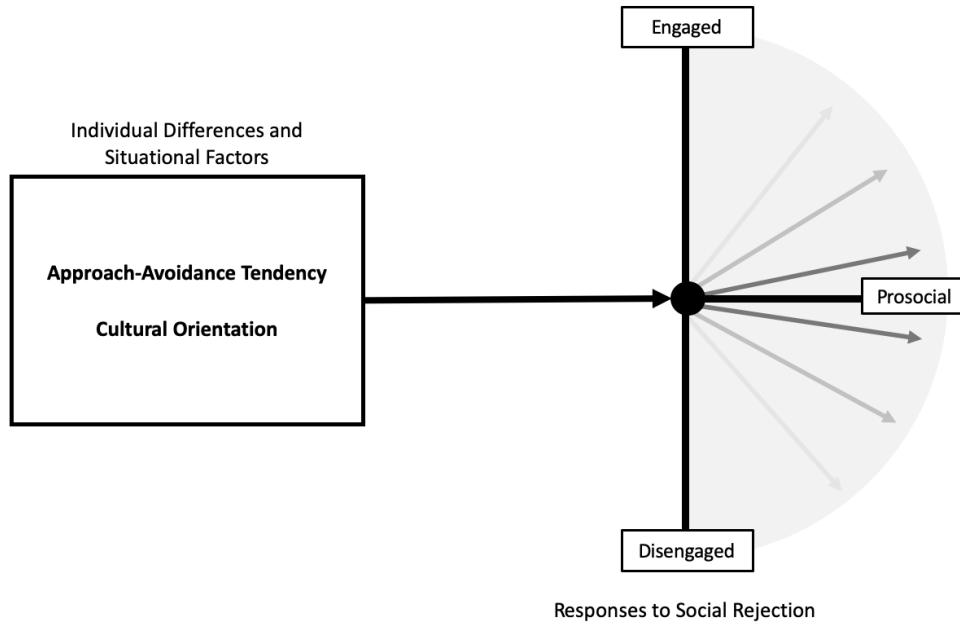


Figure 2.4: Representative individual differences and situational factors predicting prosocial engaged and disengaged responses. Only the prosocial dimension is depicted in this diagram for illustrative purposes. Approach-oriented tendencies and individualistic cultural backgrounds predict engaged prosocial responses. On the other hand, avoidance-oriented tendencies and collectivistic cultural backgrounds predict disengaged prosocial responses.

another person). With the taxonomy, we can see that this hypothesis may not be accurate. Theoretically, people with higher avoidance tendencies would display prosocial responses, but they would do so in disengaged ways (e.g., relying on social surrogates) because this response style matches their general tendency to use hands-off, avoidance-oriented strategies.

Cultural Orientation. Cultural contexts influence how people rely on social support, a form of prosocial behavior motivated by a need for affiliation (Choenarom et al., 2005; Hagerty & Williams, 1999 Jul-Aug; Kim et al., 2008). Compared with people with individualistic backgrounds (e.g., European Americans), those with collectivistic backgrounds (e.g., Asian Americans) sought more *implicit* forms of social support—emotional comfort obtained through the existing social network without directly discussing one’s problems (Kim et al., 2008). Implicit support seeking is disengaged because it is a passive behavior that allows a person to avoid potential rejection and thus future threats to belonging. On the other hand, explicit support seeking is engaged because it involves direct communication of the need for support to close others. Taken together, people with collectivistic backgrounds may use more disengaged rather than engaged prosocial responses to rejection, and people with individualistic backgrounds may use more engaged rather than disengaged prosocial responses to rejection (Figure 2.4).

These cultural predictions further highlight the risk of neglecting the engaged-disengaged *y*-axis, and how doing so could lead to incorrect conclusions. If a researcher measures only engaged prosocial responses (i.e., explicit support seeking), they would reach the erroneous conclusion that people from a collectivistic background do not engage in prosocial behavior following rejection. However, they theoretically behave prosocially following rejection, but they do so in disengaged ways (e.g., implicit support seeking). Considering both dimensions of the bi-dimensional rejection taxonomy will prevent such faulty conclusions.

2.6 Using the Bi-Dimensional Rejection Taxonomy to Inspire New and More Accurate Hypotheses

As we highlight throughout the paper, the bi-dimensional rejection taxonomy is an important advancement to the rejection literature because it helps researchers generate more nuanced and accurate hypotheses and prevents inaccurate conclusions. The taxonomy draws on available theories to make predictions about which individual and situational characteristics will predict when people will respond in one way or another. In doing so, the taxonomy allows researchers to generate innovative hypothesis incorporating all possible response options. In this section, we discuss how the bi-dimensional rejection taxonomy inspires new directions for future research. In contrast to the previous sections that demonstrated how existing evidence could be viewed through the lens of the taxonomy, this section purposefully highlights more speculative and innovative avenues for new research that have yet to be tested. Thus, the reader should take these future directions with a grain of salt; they are meant to inspire new and exciting ways to apply the taxonomy.

2.6.1 Spontaneous Reactions to Rejection

Past rejection studies relied on laboratory experiments where behavioral and self-reported response options were constrained. For example, in the hot-sauce paradigm, participants had no choice but to allocate some amount of hot sauce to a stranger without an option to respond differently (Lieberman, Solomon, Greenberg, & McGregor, 1999). Questions remain as to how rejected participants respond in real-life settings where other response options are readily available (e.g., rejected people can watch their favorite TV show, approach a friend, lash out against the perpetrator, or withdraw from others). In addition, people experiencing rejection may use multiple responses simultaneously (e.g., watching favorite TV shows and talking to friends after getting dumped). The existing literature has not investigated which responses people commonly use following rejection in the real world—an important next step to

advance the literature. One concrete recommendation is to have at least four types of response options in rejection studies. For example, daily diary or experience sampling studies could assess whether rejection occurred that day, and if so, could ask how the participant responded, ensuring that response options from each quadrant are included.

Without the bi-dimensional rejection taxonomy, researchers interested in prosocial responses may inadvertently fail to measure disengaged prosocial responses (e.g., watching a favorite TV program) and may instead solely focus on engaged prosocial responses (e.g., approaching a friend). Doing so brings with it the danger of concluding that prosocial responses do not happen in response to everyday rejection whereas, in reality, they may be happening, but in disengaged rather than engaged manners. Armed with the knowledge of the bi-dimensional rejection taxonomy, researchers can now avoid this pitfall and include response options that cover both dimensions.

An unexplored possibility is that people typically react to everyday rejection in disengaged ways (e.g., social surrogacy and social withdrawal). Past research has found that interpersonal rejection is prevalent in everyday life, ranging from subtle ignorance in social situations (e.g., no eye contact and being looked-through) to more obvious ones [e.g., being ignored in conversations, emails, and online messaging; Nezlek et al. (2012)]. People need to regularly cope with these rejection experiences to maintain their belonging. As mentioned earlier, repeated experiences of rejection may promote disengaged responses, particularly in the antisocial domain. We speculate a similar pattern for the prosocial domain—people may use disengaged prosocial responses, rather than engaged prosocial responses for repeated everyday rejection. People can replenish belonging more safely through disengaged prosocial responses because they function to avoid future need threat (i.e., further rejection). The popularity of TV, books, and social media may reflect people's preference in satisfying belonging from these disengaged prosocial activities, a provocative question for future research.

2.6.2 Neurophysiological Markers

Neurophysiological correlates can provide mechanistic answers about why rejection leads to responses that fall within the bi-dimensional rejection taxonomy. Cortisol and testosterone are potentially relevant hormonal markers that can predict rejection responses. The combination of high testosterone and low cortisol levels jointly predict dominance-seeking behaviors, often associated with engaged antisocial behaviors (e.g., physical fights and violence; (Mehta & Josephs, 2010; Platje et al., 2015; Romero-MartÃnez et al., 2013). When cortisol levels are high, dominance responses are inhibited (and submission responses are facilitated), regardless of testosterone levels. Thus, one unexamined hypothesis is that high testosterone and low cortisol levels may facilitate engaged antisocial responses to rejection. On the other hand, high cortisol levels may inhibit engaged antisocial responses and may instead facilitate disengaged antisocial responses (e.g., social withdrawal and self-neglect).

Considering the interaction between cortisol and testosterone highlights the importance of the bi-dimensional rejection taxonomy. If researchers study cortisol and testosterone in the absence of the taxonomy and measure only engaged antisocial responses, they may conclude that cortisol levels do not affect antisocial responses at all. In light of the current taxonomy, this conclusion may be unwarranted—since high cortisol levels should theoretically facilitate disengaged antisocial responses.

2.6.3 Applying the Bi-Dimensional Rejection Taxonomy to Other Threats to Belonging

The bi-dimensional rejection taxonomy offers a blueprint for future researchers who study responses to social stressors that threaten belonging. Currently, the bi-dimensional rejection taxonomy is focused on the responses to interpersonal rejection (e.g., feeling uncared for or unloved). But, other social stressors can also threaten belonging, such as separation distress [e.g., feelings of missing someone; Diamond et al. (2008)], death of a close other (Stroebe et al., 1996), and discrimination(Richman

& Leary, 2009). One interesting application of the bi-dimensional rejection taxonomy would be to examine whether responses to these belonging threats also range along the antisocial–prosocial and engaged–disengaged dimensions. Doing so will facilitate a richer understanding of how humans respond to belonging threats.

2.7 Conclusion

Existing theories of interpersonal rejection have exclusively focused on the *x*-axis, aiming to understand antisocial and prosocial responses to interpersonal rejection. Accumulating evidence suggests a gap in this approach: variability in social responses to rejection cannot solely be explained by the antisocial–prosocial dimension alone. To fill this gap, we propose the bi-dimensional rejection taxonomy, consisting of the antisocial–prosocial *x*-axis and engaged–disengaged *y*-axis, a novel contribution to the literature. This engaged–disengaged dimension explains variation among prosocial and antisocial responses previously unaccounted for, helps researchers to generate more nuanced and accurate hypotheses about how people respond to rejection, and sheds light on the types of responses that have been understudied in the literature. Thus, the bi-dimensional rejection taxonomy is an important step forward for the rejection literature. Overlooking the engaged–disengaged dimension could result in omnibus hypotheses that lack specificity, leading to erroneous and inaccurate conclusions. The bi-dimensional rejection taxonomy helps researchers to see nuances among responses, better calibrate conclusions, and test novel predictions. With this new map, we can move the literature to new frontiers.

REFERENCES

- Abeyta, A. A., Routledge, C., & Juhl, J. (2015). Looking back to move forward: Nostalgia as a psychological resource for promoting relationship goals and overcoming relationship challenges. *Journal of Personality and Social Psychology, 109*(6), 1029–1044. <https://doi.org/10.1037/pspi0000036>
- Abrams, R. C., Lachs, M., McAvay, G., Keohane, D. J., & Bruce, M. L. (2002). Predictors of Self-Neglect in Community-Dwelling Elders. *American Journal of Psychiatry*. <https://doi.org/10.1176/appi.ajp.159.10.1724>
- Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy, White women. *Health Psychology, 19*(6), 586–592. <https://doi.org/10.1037/0278-6133.19.6.586>
- Alden, L. E., & Taylor, C. T. (2004). Interpersonal processes in social phobia. *Clinical Psychology Review, 24*(7), 857–882. <https://doi.org/10.1016/j.cpr.2004.07.006>
- Amireault, S., & Godin, G. (2015). The Godin-Shephard leisure-time physical activity questionnaire: Validity evidence supporting its use for classifying healthy adults into active and insufficiently active categories. *Perceptual and Motor Skills, 120*(2), 604–622. <https://doi.org/10.2466/03.27.PMS.120v19x7>
- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology, 63*(4), 596–612. <https://doi.org/10.1037/0022-3514.63.4.596>
- Aspinwall, L. G., & Taylor, S. E. (1997). A stitch in time: Self-regulation and proactive coping. *Psychological Bulletin, 121*(3), 417–436. <https://doi.org/10.1037/0033-295X.121.3.417>

- Ayduk, Å., Gyurak, A., & Luerss, A. (2008). Individual differences in the rejection–aggression link in the hot sauce paradigm: The case of rejection sensitivity. *Journal of Experimental Social Psychology*, 44(3), 775–782. <https://doi.org/10.1016/j.jesp.2007.07.004>
- Band-Winterstein, T., Doron, I. (Issi), & Naim, S. (2012). Elder self neglect: A geriatric syndrome or a life course story? *Journal of Aging Studies*, 26(2), 109–118. <https://doi.org/10.1016/j.jaging.2011.10.001>
- Baraniuk, C. (2020). Computer games: More than a lockdown distraction. *BBC News*. <https://www.bbc.com/news/business-52210938>
- Batson, C. D., & Powell, A. A. (2003). Altruism and Prosocial Behavior. In *Handbook of Psychology*. John Wiley & Sons, Inc. <http://onlinelibrary.wiley.com/doi/10.1002/0471264385.wei0519/abstract>
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529. <https://doi.org/10.1037/0033-2909.117.3.497>
- Beresford, T. (2020). *Worldwide Digital Video Game Spending Hits Record-Breaking \$10.5B in April.* <https://www.hollywoodreporter.com/news/worldwide-digital-video-game-spending-hits-record-breaking-105-billion-april-1295670>
- Blackhart, G. C., Baumeister, R. F., & Twenge, J. M. (2006). Rejection's impact on self-defeating, prosocial, antisocial, and self-regulatory behaviors. In K. D. Vohs & E. J. Finkel (Eds.), *Self and relationships: Connecting intrapersonal and interpersonal processes*. (pp. 237–253). Guilford Press.
- Bowlby, J. (2000). *Separation: Anxiety and anger* (Reprint). Basic Books.
- Bozinovski, S. D. (2000). Older Self-Neglecters: Interpersonal Problems and the Maintenance of Self-Continuity. *Journal of Elder Abuse & Neglect*, 12(1), 37–56. https://doi.org/10.1300/J084v12n01_06
- Carver, C. S., & Connor-Smith, J. (2010). Personality and Coping. *Annual Review of Psychology*, 61(1), 679–704. <https://doi.org/10.1146/annurev.psych.093008.100352>
- Cella, D., Choi, S. W., Condon, D. M., Schalet, B., Hays, R. D., Rothrock, N. E.,

- Yount, S., Cook, K. F., Gershon, R. C., Amtmann, D., DeWalt, D. A., Pilkonis, P. A., Stone, A. A., Weinfurt, K., & Reeve, B. B. (2019). PROMIS® Adult Health Profiles: Efficient Short-Form Measures of Seven Health Domains. *Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research*, 22(5), 537–544. <https://doi.org/10.1016/j.jval.2019.02.004>
- Cepeda-Benito, A., Gleaves, D. H., Williams, T. L., & Erath, S. A. (2000). The development and validation of the state and trait food-cravings questionnaires. *Behavior Therapy*, 31(1), 151–173. [https://doi.org/10.1016/S0005-7894\(00\)80009-X](https://doi.org/10.1016/S0005-7894(00)80009-X)
- Choenarom, C., Williams, R. A., & Hagerty, B. M. (2005). The role of sense of belonging and social support on stress and depression in individuals with depression. *Archives of Psychiatric Nursing*, 19(1), 18–29. <https://doi.org/10.1016/j.apnu.2004.11.003>
- Clark, D. M. (2001). A cognitive perspective on social phobia. In *International handbook of social anxiety: Concepts, research and interventions relating to the self and shyness* (pp. 405–430). John Wiley & Sons Ltd.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A Global Measure of Perceived Stress. *Journal of Health and Social Behavior*, 24(4), 385–396. <https://doi.org/10.2307/2136404>
- Compas, B. E., Connor, J., Osowiecki, D., & Welch, A. (1997). Effortful and Involuntary Responses to Stress. In B. H. Gottlieb (Ed.), *Coping with Chronic Stress* (pp. 105–130). Springer US. https://doi.org/10.1007/978-1-4757-9862-3_4
- Connor-Smith, J. K., Compas, B. E., Wadsworth, M. E., Thomsen, A. H., & Saltzman, H. (2000). Responses to stress in adolescence: Measurement of coping and involuntary stress responses. *Journal of Consulting and Clinical Psychology*, 68(6), 976. <https://doi.org/10.1037/0022-006X.68.6.976>
- Crocker, J., & Park, L. E. (2004). The costly pursuit of self-esteem. *Psychological Bulletin*, 130(3), 392–414. <https://doi.org/10.1037/0033-2909.130.3.392>
- Davis, M. H. (1980). A multidimensional approach to individual difference in empathy.

JSAS Catalog of Selected Documents in Psychology, 85.

- Derrick, J. L., Gabriel, S., & Hugenberg, K. (2009). Social surrogacy: How favored television programs provide the experience of belonging. *Journal of Experimental Social Psychology*, 45(2), 352–362. <https://doi.org/10.1016/j.jesp.2008.12.003>
- Derrick, J. L., Gabriel, S., & Hugenberg, K. (2009). Social surrogacy: How favored television programs provide the experience of belonging. *Journal of Experimental Social Psychology*, 45(2), 352–362. <https://doi.org/10.1016/j.jesp.2008.12.003>
- DeWall, C. N., & Richman, S. B. (2011). Social exclusion and the desire to reconnect. *Social and Personality Psychology Compass*, 5(11), 919–932. <https://doi.org/10.1111/j.1751-9004.2011.00383.x>
- DeWall, C. N., Twenge, J. M., Bushman, B., Im, C., & Williams, K. (2010a). A little acceptance goes a long way: Applying social impact theory to the rejection-aggression link. *Social Psychological and Personality Science*, 1(2), 168–174. <https://doi.org/10.1177/1948550610361387>
- DeWall, C. N., Twenge, J. M., Bushman, B., Im, C., & Williams, K. (2010b). A little acceptance goes a long way: Applying social impact theory to the rejection-aggression link. *Social Psychological and Personality Science*, 1(2), 168–174. <https://doi.org/10.1177/1948550610361387>
- DeWall, C. N., Twenge, J. M., Gitter, S. A., & Baumeister, R. F. (2009). It's the thought that counts: The role of hostile cognition in shaping aggressive responses to social exclusion. *Journal of Personality and Social Psychology*, 96(1), 45–59. <https://doi.org/10.1037/a0013196>
- Diamond, L. M., Hicks, A. M., & Otter-Henderson, K. D. (2008). Every time you go away: Changes in affect, behavior, and physiology associated with travel-related separations from romantic partners. *Journal of Personality and Social Psychology*, 95(2), 385–403. <https://doi.org/10.1037/0022-3514.95.2.385>
- Dijkstra, M. T. M., & Homan, A. C. (2016). Engaging in Rather than Disengaging from Stress: Effective Coping and Perceived Control. *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.01415>

- Dong, X., Simon, M., Beck, T., & Evans, D. (2010). A cross-sectional population-based study of elder self-neglect and psychological, health, and social factors in a biracial community. *Aging & Mental Health*, 14(1), 74–84. <https://doi.org/10.1080/13607860903421037>
- Donnellan, M. B., Lucas, R. E., & Cesario, J. (2015). On the association between loneliness and bathing habits: Nine replications of Bargh and Shalev (2012) Study 1. *Emotion*, 15(1), 109–119. <https://doi.org/10.1037/a0036079>
- Downey, G., Feldman, S., & Ayduk, O. (2000). Rejection sensitivity and male violence in romantic relationships. *Personal Relationships*, 7(1), 45–61. <https://doi.org/10.1111/j.1475-6811.2000.tb00003.x>
- Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, 70(6), 1327–1343. <https://doi.org/10.1037/0022-3514.70.6.1327>
- Downey, G., Freitas, A. L., Michaelis, B., & Khouri, H. (1998). The self-fulfilling prophecy in close relationships: Rejection sensitivity and rejection by romantic partners. *Journal of Personality and Social Psychology*, 75(2), 545–560. <https://doi.org/10.1037/0022-3514.75.2.545>
- Downey, G., Lebolt, A., RincÃn, C., & Freitas, A. L. (1998). Rejection Sensitivity and Children's Interpersonal Difficulties. *Child Development*, 69(4), 1074–1091. <https://doi.org/10.1111/j.1467-8624.1998.tb06161.x>
- Elliot, A. J., Gable, S. L., & Mapes, R. R. (2006). Approach and avoidance motivation in the social domain. *Personality and Social Psychology Bulletin*, 32(3), 378–391. <https://doi.org/10.1177/0146167205282153>
- Feldman, S., & Downey, G. (1994). Rejection sensitivity as a mediator of the impact of childhood exposure to family violence on adult attachment behavior. *Development and Psychopathology*, 6(1), 231–247. <https://doi.org/10.1017/S0954579400005976>
- Funk, J. L., & Rogge, R. D. (2007). Testing the ruler with item response theory: Increasing precision of measurement for relationship satisfaction with the Couples Satisfaction Index. *Journal of Family Psychology*, 21(4), 572–583. <https://doi.org/>

10.1037/0893-3200.21.4.572

- Gable, S. L., Gosnell, C. L., Maisel, N. C., & Strachman, A. (2012). Safely testing the alarm: Close others' responses to personal positive events. *Journal of Personality and Social Psychology, 103*(6), 963–981. <https://doi.org/10.1037/a0029488>
- Gabriel, S., & Valenti, J. (2017a). Social Surrogates and Rejection: How Reading, Watching TV, and Eating Comfort Food Can Ease the Pain of Social Isolation. In K. D. Williams & S. A. Nida, *Ostracism, Exclusion, and Rejection*. Routledge.
- Gabriel, S., & Valenti, J. (2017b). Social surrogates and rejection: How reading, watching TV, and eating comfort food can ease the pain of social isolation. In K. D. Williams & S. A. Nida, *Ostracism, exclusion, and rejection*. Routledge.
- Gabriel, S., Valenti, J., & Young, A. F. (2016). Social surrogates, social motivations, and everyday activities: The case for a strong, subtle, and sneaky social self. In J. M. Olson & M. P. Zanna (Eds.), *Advances in Experimental Social Psychology* (Vol. 53, pp. 189–243). Academic Press. <http://www.sciencedirect.com/science/article/pii/S0065260115000258>
- Godin, G. (2011). The Godin-Shephard Leisure-Time Physical Activity Questionnaire. *The Health & Fitness Journal of Canada, 4*(1, 1), 18–22. <https://doi.org/10.14288/hfjc.v4i1.82>
- Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences. Journal Canadien Des Sciences Appliquées Au Sport, 10*(3), 141–146.
- Graham-Kevan, N., & Archer, J. (2003). Physical aggression and control in heterosexual relationships: The effect of sampling. *Violence and Victims, 18*(2), 181–196. <https://doi.org/10.1891/vivi.2003.18.2.181>
- Gregory, S. (2020). Don't Feel Bad if Your Kids Are Gaming More Than Ever. *Time*. <https://time.com/5825214/video-games-screen-time-parenting-coronavirus/>
- Hagerty, B. M., & Williams, R. A. (1999 Jul-Aug). The effects of sense of belonging, social support, conflict, and loneliness on depression. *Nursing Research, 48*(4), 215–219.

- Hahn, E. A., DeWalt, D. A., Bode, R. K., Garcia, S. F., DeVellis, R. F., Correia, H., Cella, D., & PROMIS Cooperative Group. (2014). New English and Spanish social health measures will facilitate evaluating health determinants. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, 33(5), 490–499. <https://doi.org/10.1037/hea0000055>
- Haslam, C., Holme, A., Haslam, S. A., Iyer, A., Jetten, J., & Williams, W. H. (2008 Oct-Dec). Maintaining group memberships: Social identity continuity predicts well-being after stroke. *Neuropsychological Rehabilitation*, 18(5-6), 671–691. <https://doi.org/10.1080/09602010701643449>
- Heyman, R. E. (2004). *Rapid Marital Interaction Coding System (RMICS)* (P. K. Kerig & D. H. Baucom, Eds.; 1st ed., p. 28). Routledge. <https://www.taylorfrancis.com/books/e/9781410610843/chapters/10.4324/9781410610843-14>
- Hoffman, K. M., Trawalter, S., Axt, J. R., & Oliver, M. N. (2016). Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites. *Proceedings of the National Academy of Sciences*, 113(16), 4296–4301. <https://doi.org/10.1073/pnas.1516047113>
- Horney, K. (1964). *The neurotic personality of our time*. Norton.
- Horney, K. (1991). *Neurosis and human growth: The struggle toward self-realization*. Norton.
- Kim, H. S., Sherman, D. K., & Taylor, S. E. (2008). Culture and social support. *American Psychologist*, 63(6), 518–526. <https://doi.org/10.1037/0003-066X>
- Konrath, S., Meier, B. P., & Bushman, B. J. (2014). Development and Validation of the Single Item Narcissism Scale (SINS). *PLoS ONE*, 9(8), e103469. <https://doi.org/10.1371/journal.pone.0103469>
- Kowert, R., & Oldmeadow, J. A. (2015). Playing for social comfort: Online video game play as a social accommodator for the insecurely attached. *Computers in Human Behavior*, 53, 556–566. <https://doi.org/10.1016/j.chb.2014.05.004>
- Langille, A., Daviau, C., & Hawreliak, J. (2020). *Playing video games can ease loneliness during the coronavirus pandemic*. <http://theconversation.com/playing-video-games-can-ease-loneliness-during-the-coronavirus-pandemic-137000>

games-can-ease-loneliness-during-the-coronavirus-pandemic-134198

- Lazarus, D. (2020). *Column: Video games are thriving amid COVID-19 and experts say that's a good thing.* <https://www.latimes.com/business/story/2020-06-16/column-coronavirus-video-games>
- Lazarus, R. S., & Folkman, S. (1984). *Stress, Appraisal, and Coping.* Springer Publishing Company.
- Leary, M. R. (1983). A brief version of the fear of negative evaluation scale. *Personality and Social Psychology Bulletin, 9*(3), 371–375. <https://doi.org/10.1177/0146167283093007>
- Leary, M. R., Tambor, E. S., Terdal, S. K., & Downs, D. L. (1995). Self-esteem as an interpersonal monitor: The sociometer hypothesis. *Journal of Personality and Social Psychology, 68*(3), 518–530. <https://doi.org/10.1037/0022-3514.68.3.518>
- Leary, M. R., Twenge, J. M., & Quinlivan, E. (2006). Interpersonal rejection as a determinant of anger and aggression. *Personality and Social Psychology Review, 10*(2), 111–132. https://doi.org/10.1207/s15327957pspr1002_2
- London, B., Downey, G., Bonica, C., & Paltin, I. (2007). Social causes and consequences of rejection sensitivity. *Journal of Research on Adolescence, 17*(3), 481–506. <https://doi.org/10.1111/j.1532-7795.2007.00531.x>
- Maner, J. K., DeWall, C. N., Baumeister, R. F., & Schaller, M. (2007). Does social exclusion motivate interpersonal reconnection? Resolving the "porcupine problem". *Journal of Personality and Social Psychology, 92*(1), 42–55. <https://doi.org/10.1037/0022-3514.92.1.42>
- Maner, J. K., DeWall, C. N., Baumeister, R. F., & Schaller, M. (2007). Does social exclusion motivate interpersonal reconnection? Resolving the "porcupine problem". *Journal of Personality and Social Psychology, 92*(1), 42–55. <https://doi.org/10.1037/0022-3514.92.1.42>
- Maslow, A. (1943). A theory of human motivation. *Psychological Review, 50*(4), 370–396. <https://doi.org/10.1037/h0054346>

- Meagher, B. R., & Marsh, K. L. (2017). Seeking the safety of sociofugal space: Environmental design preferences following social ostracism. *Journal of Experimental Social Psychology*, 68, 192–199. <https://doi.org/10.1016/j.jesp.2016.07.004>
- Mehta, P. H., & Josephs, R. A. (2010). Testosterone and cortisol jointly regulate dominance: Evidence for a dual-hormone hypothesis. *Hormones and Behavior*, 58(5), 898–906. <https://doi.org/10.1016/j.yhbeh.2010.08.020>
- Miron-Spektor, E., Ingram, A., Keller, J., Smith, W. K., & Lewis, M. W. (2018). Microfoundations of Organizational Paradox: The Problem Is How We Think about the Problem. *Academy of Management Journal*, 61(1), 26–45. <https://doi.org/10.5465/amj.2016.0594>
- Murray, S. L., Derrick, J. L., Leder, S., & Holmes, J. G. (2008a). Balancing connectedness and self-protection goals in close relationships: A levels-of-processing perspective on risk regulation. *Journal of Personality and Social Psychology*, 94(3), 429–459. <https://doi.org/10.1037/0022-3514.94.3.429>
- Murray, S. L., Derrick, J. L., Leder, S., & Holmes, J. G. (2008b). Balancing connectedness and self-protection goals in close relationships: A levels-of-processing perspective on risk regulation. *Journal of Personality and Social Psychology*, 94(3), 429–459. <https://doi.org/10.1037/0022-3514.94.3.429>
- Murray, S. L., Holmes, J. G., & Collins, N. L. (2006). Optimizing assurance: The risk regulation system in relationships. *Psychological Bulletin*, 132(5), 641–666. <https://doi.org/10.1037/0033-2909.132.5.641>
- Murray, S. L., Rose, P., Bellavia, G. M., Holmes, J. G., & Kusche, A. G. (2002). When rejection stings: How self-esteem constrains relationship-enhancement processes. *Journal of Personality and Social Psychology*, 83(3), 556–573. <https://doi.org/10.1037/0022-3514.83.3.556>
- Nadzan, M. A., & Jaremka, L. M. (2017). *Modified Need-Threat Scale*.
- Nezlek, J. B., Wesselmann, E. D., Wheeler, L., & Williams, K. D. (2012). Ostracism in Everyday Life. *Group Dynamics: Theory, Research, and Practice*. <https://doi.org/10.1037/a0028029>

- Park, L. E. (2010). Responses to self-threat: Linking self and relational constructs with approach and avoidance motivation. *Social and Personality Psychology Compass*, 4(3), 201–221. <https://doi.org/10.1111/j.1751-9004.2009.00247.x>
- Parrott, D. J., & Giancola, P. R. (2007). Addressing ‘The criterion problem’ in the assessment of aggressive behavior: Development of a new taxonomic system. *Aggression and Violent Behavior*, 12(3), 280–299. <https://doi.org/10.1016/j.avb.2006.08.002>
- Platje, E., Popma, A., Vermeiren, R. R. J. M., Doreleijers, T. A. H., Meeus, W. H. J., van Lier, P. A. C., Koot, H. M., Branje, S. J. T., & Jansen, L. M. C. (2015). Testosterone and cortisol in relation to aggression in a non-clinical sample of boys and girls. *Aggressive Behavior*, 41(5), 478–487. <https://doi.org/10.1002/ab.21585>
- Postmus, J. L., Stylianou, A. M., & McMahon, S. (2015). The Abusive Behavior Inventory—Revised. *Journal of Interpersonal Violence*, 0886260515581882. <https://doi.org/10.1177/0886260515581882>
- Proulx, T., & Heine, S. J. (2008). The case of the transmogrifying experimenter affirmation of a moral schema following implicit change detection. *Psychological Science*, 19(12), 1294–1300. <https://doi.org/10.1111/j.1467-9280.2008.02238.x>
- Radloff, L. S. (1977). The CES-D Scale A Self-Report Depression Scale for Research in the General Population. *Applied Psychological Measurement*, 1(3), 385–401. <https://doi.org/10.1177/014662167700100306>
- Ren, D., Wesselmann, E., & Williams, K. D. (2015). Evidence for another response to ostracism solitude seeking. *Social Psychological and Personality Science*, 1948550615616169. <https://doi.org/10.1177/1948550615616169>
- Richman, L. S., & Leary, M. R. (2009). Reactions to discrimination, stigmatization, ostracism, and other forms of interpersonal rejection: A multimotive model. *Psychological Review*, 116(2), 365–383. <https://doi.org/10.1037/a0015250>
- Riva, P., Montali, L., Wirth, J. H., Curioni, S., & Williams, K. D. (2017). Chronic social exclusion and evidence for the resignation stage: An empirical investigation. *Journal of Social and Personal Relationships*, 34(4), 541–564. <https://doi.org/10.1177/0886260517713102>

1177/0265407516644348

- Roets, A., & Van Hiel, A. (2011). *Item selection and validation of a brief, 15-item version of the Need for Closure Scale.* 50, 90–94. <https://doi.org/10.1016/j.paid.2010.09.004>
- Romero-Canyas, R., Downey, G., Reddy, K. S., Rodriguez, S., Cavanaugh, T. J., & Pelayo, R. (2010). Paying to belong: When does rejection trigger ingratiation? *Journal of Personality and Social Psychology.*, 99(5), 802–823. <https://doi.org/10.1037/a0020013>
- Romero-Canyas, R., Downey, G., Reddy, K. S., Rodriguez, S., Cavanaugh, T. J., & Pelayo, R. (2010). Paying to belong: When does rejection trigger ingratiation? *Journal of Personality and Social Psychology.*, 99(5), 802–823. <https://doi.org/10.1037/a0020013>
- Romero-Martínez, A., González-Bono, E., Lila, M., & Moya-Albiol, L. (2013). Testosterone/cortisol ratio in response to acute stress: A possible marker of risk for marital violence. *Social Neuroscience*, 8(3), 240–247. <https://doi.org/10.1080/17470919.2013.772072>
- Rosenberg, M. (1965). The Measurement of Self-Esteem. In *Society and the Adolescent Self-Image* (pp. 16–36). Princeton University Press. <https://doi.org/10.2307/j.ctt183pjjh.5>
- Rosenblatt, A., Greenberg, J., Solomon, S., Pyszczynski, T., & Lyon, D. (1989). Evidence for terror management theory: I. The effects of mortality salience on reactions to those who violate or uphold cultural values. *Journal of Personality and Social Psychology*, 57(4), 681–690.
- Rusbult, C. E. (1987). Responses to dissatisfaction in close relationships: The exit-voice-loyalty-neglect model. In D. Perlman & S. Duck (Eds.), *Intimate relationships: Development, dynamics, and deterioration* (pp. 209–237). Sage Publications, Inc.
- Rusbult, C. E., & Verette, J. (1991). An interdependence analysis of accommodation processes in close relationships. *Representative Research in Social Psychology*,

19(1), 3–33.

- Rusbult, C. E., Zembrod, I. M., & Gunn, L. K. (1982a). Exit, voice, loyalty, and neglect: Responses to dissatisfaction in romantic involvements. *Journal of Personality and Social Psychology*, 43(6), 1230. <https://doi.org/10.1037/0022-3514.43.6.1230>
- Rusbult, C. E., Zembrod, I. M., & Gunn, L. K. (1982b). Exit, voice, loyalty, and neglect: Responses to dissatisfaction in romantic involvements. *Journal of Personality and Social Psychology*, 43(6), 1230. <https://doi.org/10.1037/0022-3514.43.6.1230>
- Scheier, M. F., Weintraub, J. K., & Carver, C. S. (1986). Coping with stress: Divergent strategies of optimists and pessimists. *Journal of Personality and Social Psychology*, 51(6), 1257–1264. <https://doi.org/10.1037/0022-3514.51.6.1257>
- Shanley, P. (2020). *Gaming Usage Up 75 Percent Amid Coronavirus Outbreak, Verizon Reports*. <https://www.hollywoodreporter.com/news/gaming-usage-up-75-percent-coronavirus-outbreak-verizon-reports-1285140>
- Shilling, A. A., & Brown, C. M. (2015). Goal-Driven Resource Redistribution: An Adaptive Response to Social Exclusion. *Evolutionary Behavioral Sciences*. <https://doi.org/10.1037/ebs0000062>
- Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of coping: A review and critique of category systems for classifying ways of coping. *Psychological Bulletin*, 129(2), 216–269. <https://doi.org/10.1037/0033-2909.129.2.216>
- Snyder, M. (1974). Self-monitoring of expressive behavior. *Journal of Personality and Social Psychology*, 30(4), 526–537. <https://doi.org/10.1037/h0037039>
- South Richardson, D. (2014). Everyday Aggression Takes Many Forms. *Current Directions in Psychological Science*, 23(3), 220–224. <https://doi.org/10.1177/0963721414530143>
- Stroebe, W., Stroebe, M., Abakoumkin, G., & Schut, H. (1996). The role of loneliness and social support in adjustment to loss: A test of attachment versus stress theory. *Journal of Personality and Social Psychology*, 70(6), 1241–1249. <https://doi.org/10.1037/0022-3514.70.6.1241>

- Stunkard, A. J., & Messick, S. (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research*, 29(1), 71–83. [https://doi.org/10.1016/0022-3999\(85\)90010-8](https://doi.org/10.1016/0022-3999(85)90010-8)
- Sunami, N., Nadzan, M. A., & Jaremka, L. M. (2019). The bi-dimensional rejection taxonomy: Organizing responses to interpersonal rejection along antisocialprosocial and engageddisengaged dimensions. *Social and Personality Psychology Compass*, 13(9). <https://doi.org/10.1111/spc.12497>
- SuperData Staff. (2020). Worldwide digital games market. <https://www.superdataresearch.com/blog/worldwide-digital-games-market>
- Tobin, D. L., Holroyd, K. A., Reynolds, R. V., & Wigal, J. K. (1989). The hierarchical factor structure of the coping strategies inventory. *Cognitive Therapy and Research*, 13(4), 343–361. <https://doi.org/10.1007/BF01173478>
- Twenge, J. M., Baumeister, R. F., Tice, D. M., & Stucke, T. S. (2001). If you can't join them, beat them: Effects of social exclusion on aggressive behavior. *Journal of Personality and Social Psychology*, 81(6), 1058–1069. <https://doi.org/10.1037/0022-3514.81.6.1058>
- Vella, K., Johnson, D., & Hides, L. (2015). *Playing alone, playing with others: Differences in player experience and indicators of wellbeing*. 312. <https://doi.org/10.1145/2793107.2793118>
- Warburton, W. A., Williams, K. D., & Cairns, D. R. (2006a). When ostracism leads to aggression: The moderating effects of control deprivation. *Journal of Experimental Social Psychology*, 42(2), 213–220. <https://doi.org/10.1016/j.jesp.2005.03.005>
- Warburton, W. A., Williams, K. D., & Cairns, D. R. (2006b). When ostracism leads to aggression: The moderating effects of control deprivation. *Journal of Experimental Social Psychology*, 42(2), 213–220. <https://doi.org/10.1016/j.jesp.2005.03.005>
- Wei, M., Russell, D. W., Mallinckrodt, B., & Vogel, D. L. (2007). The Experiences in Close Relationship Scale (ECR)-Short Form: Reliability, Validity, and Factor Structure. *Journal of Personality Assessment*, 88(2), 187–204. <https://doi.org/10.1080/00223890701268041>

- Wildschut, T., Sedikides, C., Routledge, C., Arndt, J., & Cordaro, F. (2010). Nostalgia as a repository of social connectedness: The role of attachment-related avoidance. *Journal of Personality and Social Psychology*, 98(4), 573–586. <https://doi.org/10.1037/a0017597>
- Williams, K. D. (2009). Ostracism: A temporal need-threat model. In M. P. Zanna (Ed.), *Advances in experimental social psychology*, Vol 41. (pp. 275–314). Elsevier Academic Press.
- Williams, K. D., & Govan, C. L. (2005). Reacting to ostracism: Retaliation or reconciliation? In D. Abrams, M. A. Hogg, & J. M. Marques (Eds.), *The social psychology of inclusion and exclusion*. (pp. 47–62). Psychology Press.
- Williams, K. D., & Sommer, K. L. (1997). Social ostracism by coworkers: Does rejection lead to loafing or compensation? *Personality and Social Psychology Bulletin*, 23(7), 693–706. <https://doi.org/10.1177/0146167297237003>
- Zadro, L. (2004). *Ostracism: Empirical studies inspired by real-world experiences of silence and exclusion*.
- Zhang, Y., Waldman, D. A., Han, Y.-L., & Li, X.-B. (2015). Paradoxical Leader Behaviors in People Management: Antecedents and Consequences. *Academy of Management Journal*, 58(2), 538–566. <https://doi.org/10.5465/amj.2012.0995>

Appendix A

DETAILED DESCRIPTION OF THE MEASURES INCLUDED IN STUDY 1

A.1 Study 1a: Mass Testing

Center for Epidemiologic Studies Depression Scale (CES-D). The Center for Epidemiologic Studies Depression Scale is a 20-item measure of depressive symptoms (Radloff, 1977). Participants answered how frequently they experienced a depressive symptom (e.g., “I was bothered by things that usually don’t bother me.”) over a past week on a 4-point scale (0 = Rarely or none of the time, 1 = Some or little of the time [1–2 days], 2 = Occasionally or a moderate amount of time [3–4 days], 3 = Most or all of the time [5–7 days]). I used the sum of the scores as an index. Cronbach’s alpha for the current sample was .90.

Patient-Reported Outcomes Measurement Information System (PROMIS) Social Isolation—Short Form 8a The study used the Social Isolation subscale of the Patient-Reported Outcomes Measurement Information System (PROMIS), Short Form 8a (Cella et al., 2019; Hahn et al., 2014). The scale had 8 statements (e.g., “I felt left out”). For each statement, participants answered how they felt in the past four weeks on a 5-point scale (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Usually, 5 = Always). I calculated the average score as an index of social isolation. Cronbach’s alpha for the current sample was .95. The social isolation subscale demonstrated concurrent validity with other measures of social functioning (Hahn et al., 2014).

Beliefs about Biological Differences between Blacks and Whites Scale. The Beliefs about Biological Differences between Blacks and Whites Scale is a 15-item

measure of the false beliefs about biological differences between Blacks and Whites (Hoffman et al., 2016). For each item (e.g., “Blacks have a more sensitive sense of smell than Whites; they can differentiate odors and detect faint smells better than Whites.”), participants indicated how true each item is on a 6-point scale (1 = definitely untrue, 6 = definitely true). Among the 15 items, 4 items were fillers that described true differences (“Whites are less susceptible to heart disease like hypertension than Blacks,” “Blacks are less likely to contract spinal cord diseases like multiple sclerosis,” “Blacks, on average, have denser, stronger bones than Whites,” “Whites are less likely to have a stroke than Blacks”). I calculated the average of the 11 items that describe false beliefs as an index. Cronbach’s alpha for the current sample was .94.

Interpersonal Reactivity Scale. The Interpersonal Reactivity Scale is a 28-item measure of a tendency to react to another person’s experience (Davis, 1980). The scale consisted of four subscales: perspective taking (one’s tendency to adopt another’s perspective), fantasy (tendency to transport themselves into the feelings and actions of characters in media), empathic concern (tendency to feel sympathy for others in misfortune), personal distress (tendency to feel anxiety in tense situations). For each item, participants read a statement (e.g., “I often have tender, concerned feelings for people less fortunate than me.”) and indicated how much it describes themselves on a 5-point scale (0 = (A) does not describe me very well, 4 = (E) describes me very well). I calculated an average score within each subscale. Cronbach’s alpha for the current sample were .80 for the total score, .71 for perspective taking, .77 for fantasy, .78 for empathic concern, and .71 for personal distress.

Self-Monitoring Scale. The self-monitoring scale is a 24-item measure of a tendency to self-observe and control one’s behavior according to social appropriateness (Snyder, 1974). For each item, participants read a statement (e.g., “I find it hard to imitate the behavior of other people”) and indicated whether the statement was true or mostly true (T) or false or usually not true (F). Each answer that corresponded with self-monitoring received a score of 1. I calculated the sum of the scores as an index.

Paradox Mindset Scale. The Paradox Mindset Scale is a 9-item measure of one’s tendency to accept and get excited by tensions (Miron-Spektor et al., 2018). Participants read statements (e.g., “When I consider conflicting perspectives, I gain a better understanding of an issue.”) then indicated their agreement on a 7-point scale (-3 = strongly disagree to 3 = strongly agree). I calculated an average across items. Cronbach’s alpha for the current sample was .85.

Integrative Complexity Scale. The Integrative Complexity Scale is a 11-item measure of the capacity to acknowledge the competing opinions and to integrate different perspectives on an issue in an organizational setting (Zhang et al., 2015). For each item, participants read a statement (e.g., “I believe in the value of dissent.”) and indicated their agreement on a 7-point scale. I calculated an average across items. Cronbach’s alpha for the current sample was .86.

Multiple Identity Scale. Four items from the Exeter Identity Transitions Scales (Haslam et al., 2008 Oct-Dec) measured membership to different social groups. Participants indicate their agreement on a statement (e.g., “I am a member of lots of different social groups.”) on a 7-point scale (1 = do not agree at all, 7 = agree completely). I calculated an average as an index of multiple identity. Cronbach’s alpha for the current sample was .91.

A.2 Study 1b: RAIv1

Cronbach’s alsphas for the current sample was .88 for the PROMIS Social Isolation Scale.

MacArthur Scale of Subjective Social Status. The MacArthur Scale of Subjective Social Status is a single-item measure of subjective social status (Adler et al., 2000). Participants saw a ladder with 10 rungs that represented where people stand in the United States. Participants answered where they place themselves in this ladder on a 11-point scale (0 = at the ground to 100 = the top rung, with 10-point increments).

**Patient-Reported Outcomes Measurement Information System
(PROMIS) Emotional Support, and Informational Support—Short Form**

8a. The study used the Emotional Support and Informational Support subscales of the Patient-Reported Outcomes Measurement Information System (PROMIS), Short Form 8a (Cella et al., 2019; Hahn et al., 2014). Each subscales had 8 statements (e.g., “I had someone who listened to me when I needed to talk” for emotional support, and “I had someone to give me good advice about a crisis if I needed it” for informational support). For each statement, participants answered how they felt in the past four weeks on a 5-point scale (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Usually, 5 = Always). I calculated the sum scores for each subscale. Cronbach’s alpha for the current sample were .92 for emotional support, and .92 for informational support. The social support subscale demonstrated concurrent validity with other measures of social functioning (Hahn et al., 2014). People without comorbidities reported lower informational support than those with comorbidities, demonstrating a construct validity by known groups (Hahn et al., 2014).

Couple Satisfaction Index—4-item version. The Couples Satisfaction Index—4-item Version is a measure of the quality of a romantic relationship (Funk & Rogge, 2007). The scale consisted of four items, (1) “Please indicate the degree of happiness, all things considered, of your relationship with your romantic partner during the past four weeks,” (2) “I had a warm and comfortable relationship with my partner during the past four weeks,” (3) “How rewarding was your relationship with your partner during the past four weeks?” (4) “In general, how satisfied were you with your relationship with your romantic partner during the past four weeks?” Participants used a 7-point scale to answer the first item (0 = Extremely Unhappy, 6 = Perfect) and a 6-point scale for the Items 2, 3, and 4 (1 = Not at all to 6 = Completely true for Item 2, Not at all to 6 = Completely for Items 3 and 4). I calculated the aggregated average as an index. Cronbach’s alpha for the current sample was .95. The scale showed a convergent validity ($r = .84\text{--}.94$) with the other scales measuring relationship

satisfaction (Funk & Rogge, 2007).

Inclusion of Other in Self Scale. The Inclusion of Other in Self Scale is a single-item measure of closeness between the self and the other person (Aron et al., 1992). The scale consisted of 7 pairs of circles (labeled “Self” and “Other”) with varying degrees of overlap to each other (1 = no overlapping between Self and Other, 7 = highest overlap between Self and Other). Participants were instructed to select the picture that best describes their feeling to the person they wrote about in the essay. The scale showed convergent validity with verbal measures of closeness, especially for romantic relationships (Aron et al., 1992). The test-retest reliability over a 2-week period ranged from $r = .83$ to $r = .86$ (Aron et al., 1992).

Romantic Partner Responsiveness. The study adopted three items measuring romantic partner responsiveness from a previous longitudinal study (Gable et al., 2012). The items were, “My [ex-] romantic partner understood me,” “My [ex-] romantic partner made me feel like he/she valued my abilities and opinions.” and “My [ex-] romantic partner made me feel cared for.” Participants indicated their answers on a 5-point scale (1 = Not at all, 5 = Very much). I calculated an average across 3 items as an index of partner responsiveness. Cronbach’s alpha for the current sample was .86.

Relationship Conflict Scale. Study 1c used a 3-item ad-hoc measure of relationship conflicts in the past four weeks. Items were: “How often did you and your [ex-romantic] partner have arguments or disagreements?” “How often did you and your [ex-] romantic partner have arguments or disagreements that were serious enough to negatively affect your relationship?” and “How often did you and your [ex-] romantic partner have unresolved conflicts or disagreements?” Participants indicated their answers on a 7-point scale (1 = Never, 7 = Regularly). I used an aggregated average as an index. Cronbach’s alpha for the current sample was .83.

Ostracism from Romantic Partner Scale. Study 1c used an ad-hoc 10-item measure of ostracism from a romantic partner developed for the study. Participants

indicated their experience in the past 4 weeks (e.g., “[My partner/ex-romantic partner] Treated me as if I was invisible”) on a 5-point scale (1 = Never, 5 = Always). I used an aggregated average as an index of ostracism from a romantic partner. Cronbach’s alpha for the current sample was .80.

Abusive Behavior Inventory—Psychological Abuse & Physical Abuse

Subscales. Study 1c used a modified version of the Psychological Abuse and Physical Abuse subscales of the Abusive Behavior Inventory—Revised (Postmus et al., 2015), for measuring the perpetration of abusive behavior by participants against their romantic partner. The Psychological Abuse and Psychological Abuse subscales had 12 items and 11 items, respectively. Participants reported how often they perpetrated psychological (e.g., “Call your ex-romantic partner a name and/or criticize him/her”) and physical (e.g., “Threaten to hit or throw something at your ex-romantic partner”) abusive behaviors to their current and ex-romantic partner (if any) in the past four weeks on a 5-point scale (1 = Never, 5 = Very Often). I used an aggregated average for each subscale. Cronbach’s alphas for the current sample were .78 for the psychological abuse subscale. I was not able to calculate Cronbach’s alpha for the physical abuse subscale given the high invariance in responses.

Controlling Behavior Scale—Modified. Study 1c used a modified version of the Controlling Behavior Scale (Donnellan et al., 2015) measuring perpetration of controlling behavior in a close relationship in five categories (economic control, threats, intimidation, emotional control, and isolation). Participants were asked to indicate how often they did the actions described in each item on a 5-point scale (0 = Never, 4 = Always). Example items were, “Make it difficult for your [ex-] romantic partner to work or study” for economic control, “Threaten to harm your [ex-] romantic partner” for threatening control, “Try to make your [ex-] partner do things they didn’t want to” for intimidating control, “Try to put your [ex-] partner down when getting ‘too big for his or her boots’” for emotional control, and “Try to restrict time your [ex-] partner spent with family or friends” for isolating control. I used an aggregated average for each subscale.

Cronbach's alphas were .24 for the economic control, .14 for the emotional control, and .76 for the isolating control subscales. I was not able to calculate Cronbach's alpha given the invariance in the responses for threatening control and intimidation control. The scale showed a construct validity by differentiating criminally violent perpetrators and non-perpetrators (Graham-Kevan & Archer, 2003).

Modified Food Cravings Questionnaire—Trait Version. Study 1c used a modified version of the Food Cravings Questionnaire—Trait Version (Cepeda-Benito et al., 2000) is a trait measure of food cravings. Study 1c used the following 6 subscales: (1) Intentions and Plans to Consume Food (3 items; e.g., "Food cravings invariably made me think of ways to get what I wanted to eat"), (2) Lack of Control Over Eating (6 items; e.g., "When I craved something, I knew I wouldn't be able to stop eating once I started"), (3) Thoughts or Preoccupation with Food (7 items; e.g., "I felt like I had food on my mind all the time"), (4) Emotions (4 items; e.g., "I craved foods when I felt bored, angry, or sad"), (5) Cues that Trigger Food Cravings (4 items; e.g., "Being with someone who was eating often made me hungry"), and (6) Guilt From Cravings and/or for Giving Into Them (3 items; e.g., "I hated it when I gave in to cravings"). For each item, participants indicate their agreement on a 5-point scale (1 = Strongly disagree, 5 = Strongly agree). I calculated an aggregated average for each subscale and an overall index. Cronbach's alphas were .84 for the intentions, .93 for lack of control, .90 for thoughts, .62 for emotions, .69 for cues, and .89 guilt subscales (overall alpha = .96). The scale showed convergent validity with the Eating Questionnaire (Stunkard & Messick, 1985).

Dietary Social Support Scale. The ad-hoc dietary support scale was a 9-item scale measuring how much participants received support from their current romantic partner on their eating habits over the past 4 weeks. Participants saw statements about their partner (e.g., "Complimented me on my eating habits") and indicated their answer on a 5-point scale (1 = Never or almost never, 5 = Almost always). I calculated an average across items as an index. Cronbach's alpha for the current sample

was .76.

Body Image Questionnaire. The Body Image Questionnaire consisted of 9 images of female and male body images corresponding to BMIs of 17, 19, 22, 24, 26, 29, 33, 37, and 40 (the image available at: <https://web.archive.org/web/20200817174630/https://www.windbercare.org/do-you-know-the-difference-between-bmi-and-body-fat/>). Participants were asked to choose which of the images best represented themselves.

Godin-Shephard Leisure-Time Physical Activity Questionnaire. The Godin Leisure-Time Exercise Questionnaire is a 3-item measure of physical activity (Godin, 2011; Godin & Shephard, 1985). Participants answered how many times they did strenuous, moderate, and mild exercise per week on average in the past month. I used the following formula to calculate the weekly leisure-time activity scores: $(9 \times \text{Strenuous}) + (5 \times \text{Moderate}) + (3 \times \text{Mild})$. People with the scores of 24 and more had lower body fat percentage and higher maximum rate of oxygen consumption ($\text{VO}_2 \text{ max}$) than those with scores of 23 or less (Amireault & Godin, 2015).

PROMIS Sleep Disturbance—Short Form 4a. The PROMIS Sleep Disturbance—Short Form 4a is a 4-item measure of sleep disturbance (Cella et al., 2019). Participants were asked about their sleep over the past four weeks. For the first item, participants indicate their general sleep quality on a 5-point scale (“My sleep quality was:” 1 = Very poor, 5 = Very good, reverse-coded). For the items 2–4, participants rated their sleep quality (“My sleep was refreshing” (reverse-coded), “I had a problem with my sleep,” and “I had difficulty falling asleep”). I calculated the sum of the scores with higher scores representing higher sleep disturbance. Cronbach’s alpha for the current sample was XX. The scale had a concurrent validity with a measure of general health (Cella et al., 2019).

Single-Item Narcissism Scale. The Single-Item Narcissism Scale is a 1-item measure of narcissism (Konrath et al., 2014). Participants were asked, “To what extent do you agree with the statement: ‘I am a narcissist.’?” The scale provided the definition

of a narcissist (“Note: The word “narcissist” means egotistical, self-focused, and vain.”). Participants answered on a 7-point scale (1 = Not very true of me, 7 = Very true of me). The scale has a convergent validity with other measures of narcissism (Konrath et al., 2014).

Perceived Stress Scale. The Perceived Stress Scale is a 14-item measure of perceived stress (Cohen et al., 1983). Participants indicated how frequently they experienced a stressful event in the past four weeks (e.g., How often have you been upset because of something that happened unexpectedly?) on a 5-point scale (0 = Never, 4 = Very often). I calculated an aggregated average as an index. Cronbach’s alpha for the current sample was .87. The scale has a convergent validity with measures of depression, stressful life events, and physical symptoms, such as headache, back ache, and acid stomach (Cohen et al., 1983).

A.3 Study 1c: ARv1

Modified Need-Threat Scale—Essay Version. Study 1d used a modified version of the Need-Threat Scale (Williams, 2009). The scale consisted of the original 20 statements of the Need-Threat Scale. The instructions asked participants to think about their feelings when they recalled and wrote their essay. Participants indicated their agreement with each statement on a 5-point scale (1 = Strongly disagree, 5 = Strongly agree). I calculated an aggregated average for each subscale, and an overall average. Cronbach’s alphas for the current sample was .96. for the overall score (belonging = .95, self-esteem = .90, control = .90, and meaningful existence = .82).

A.4 Study 1d: EVv1

Need for Closure Scale. The Need for Closure Scale was a 15-item measure of a need for closure, a desire for an answer on any topic (Roets & Van Hiel, 2011). Participants answered their agreement on statements (e.g., “I don’t like situations that are uncertain”) on a 7-point scale (-3 = strongly disagree, +3 = strongly agree). I

will use the average score across items as an index for need for closure. The scale showed convergent validity with constructs, such as need for structure and right-wing authoritarianism, related to need for closure (Roets & Van Hiel, 2011). Cronbach's alpha for the current sample was .82.

Social Judgment Survey. The Social Judgement Survey is a single-item measure of adherence to the traditional cultural values (Proulx & Heine, 2008; Rosenblatt et al., 1989). The survey asks participants to read a case brief of a defendant accused of prostitution, and answer how much bond should be assigned to the defendant. Higher amounts of bond indicates higher adherence to the traditional cultural values, and lower bond indicates lower adherence. The scale was found sensitive to the mortality salience and expectancy violation manipulations (Proulx & Heine, 2008; Rosenblatt et al., 1989).

A.5 Study 1e: NPSv2

Modified Need-Threat Scale. I used a modified version of the Need-Threat Scale (Nadzan & Jaremka, 2017) to measure feelings of belonging, self-esteem, and control (Williams, 2009). The original Need-Threat Scale asked participants to retrospectively report their feelings during a Cyberball game. Instead, this modified version asks participants to answer according to how they feel at the moment (“right now”). Example items included “How accepted do you feel?” for belonging, “How confident do you feel?” for self-esteem, “How much control do you feel like you have?” for control, and “How important do you feel?” Participants indicated their answers on a horizontal slider ranging from 0 (The least I could possibly ever feel) and 100 (the most I could ever possibly feel), to minimize floor and ceiling effects. I calculated an average for each subscale as an index. The Cronbach's alpha for the current sample was .77 (Time 3) and .74 (Time 5) for belonging, .79 (Time 3) and .80 (Time 5) for self-esteem, .68 (Time 3) and .79 (Time 5) for control, and .68 (Time 3) and .75 (Time 5) for meaningful existence. This modified scale has not been validated.

Experiences in Close Relationships Scale—Short Form. The Experiences in Close Relationships Scale—Short Form is a 12-item measure of attachment avoidance and anxiety (Wei et al., 2007). Participants were asked to indicate their agreement on sentences referring to concerns in intimate relationships on a 7-point scale (-3 = “Strongly disagree” to 3 “Strongly agree”). Example items included “I want to get close to others but I keep pulling back” for avoidance and “I find that people don’t want to get as close as I would like” for anxiety. I calculated an average for each subscale as an index. Cronbach’s alphas for the current sample were .74 for the avoidance subscale and .73 for the anxiety subscale. Both subscales showed convergent and discriminant validities (Wei et al., 2007).

Fear of Negative Evaluation Scale—Brief Version. The Fear of Negative Evaluation is a 15-item measure of apprehension in expecting negative judgment from others (Leary, 1983). For each item, participants read a sentence (e.g., “I worry about what other people will think of me even when I know it doesn’t make any difference.”) and rated how characteristic it is of themselves on a 5-point scale (1 = “Not at all characteristic of me” and 5 = “Extremely characteristic of me”). I calculated an average across 15 items as an index of fear of negative evaluation. Cronbach’s alpha for the current sample was .91. The scale showed convergent validity with existing measures of social avoidance and anxiety (Leary, 1983).

Rosenberg Self-Esteem Scale. The Rosenberg Self-Esteem Scale is a 10-item measure of self-esteem (Rosenberg, 1965). Participants answered how much they agreed to statements (e.g., “I feel that I am a person of worth, at least on an equal basis with others.”) on a 7-point scale (-3 = “Strongly disagree” to 3 = “Strongly agree”). I calculated an average across 10 items as an index of self-esteem. Cronabch’s alpha for the current sample was .89. The scale has convergent validity with measures of optimism, life satisfaction, and narcissism (Rosenberg, 1965).

Rejection Sensitivity Questionnaire—Short Version. The Rejection Sensitivity Questionnaire—Short Version is an 8-item version of the Rejection Sensitivity

Questionnaire (Downey & Feldman, 1996; Romero-Canyas et al., 2010). The scale consisted of 8 scenarios describing a situation that can possibly evoke social rejection by another person (e.g., “You ask your parents for help in deciding what programs to apply to.”). All items are relevant to the college student sample. For each scenario, participants rated (a) how concerned or anxious they were about how the other person would respond (1 = Not at all concerned, 6 = Very concerned), and (b) how much they expected rejection to happen (1 = Very unlikely, 6 = Very likely) on a 6-point scale (ranging from 1 = Not at all concerned or very unlikely to 6 = very concerned or very likely). Following the scoring guidelines, I created a scale composite by multiplying the two responses for each scenario (a and b) and averaging across the multiplied scores. Cronbach’s alpha for the current sample was .70.

Appendix B

SUPPLEMENTARY FIGURES AND ANALYSES BY STUDY

B.1 Study 1

B.1.1 Study 1a

B.1.1.1 Correlations Table

Table B.1: Study 1a - Descriptive Statistics and Correlations among Variables

| Variable | <i>n</i> | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-----------------------|----------|----------|-----------|-------|-------|-------|-------|-------|------|-------|------|------|-------|------|------|------|
| 1. Heart | 571 | 6.30 | 1.93 | | | | | | | | | | | | | |
| 2. Valence | 571 | 6.33 | 1.65 | .71* | | | | | | | | | | | | |
| 3. CESD | 571 | 17.15 | 10.41 | -.58* | -.67* | | | | | | | | | | | |
| 4. Isolation | 566 | 2.20 | 0.89 | -.60* | -.60* | .71* | | | | | | | | | | |
| 5. Biological Beliefs | 570 | 2.33 | 0.95 | -.11* | -.08* | .12* | .14* | | | | | | | | | |
| 6. Reactivity | 569 | 2.33 | 0.42 | .01 | .00 | .10* | .10* | .03 | | | | | | | | |
| 7. Perspective | 570 | 2.48 | 0.59 | .00 | -.03 | .05 | .04 | -.01 | .71* | | | | | | | |
| 8. Fantasy | 570 | 2.40 | 0.75 | -.03 | .01 | .07 | .08* | .05 | .71* | .30* | | | | | | |
| 9. Empathy | 569 | 2.74 | 0.66 | .16* | .11* | -.05 | -.07 | -.07 | .77* | .50* | .41* | | | | | |
| 10. Distress | 569 | 1.55 | 0.66 | -.12* | -.10* | .20* | .22* | .11* | .27* | -.09* | -.06 | -.03 | | | | |
| 11. Monitoring | 572 | 12.19 | 3.62 | -.09* | -.09* | .20* | .12* | .06 | .08 | .02 | .20* | -.01 | -.06 | | | |
| 12. Paradox | 571 | 4.66 | 0.83 | .03 | -.01 | .01 | .02 | -.04 | .06 | .20* | .09* | .07 | -.27* | .08* | | |
| 13. Complexity | 568 | 4.98 | 0.74 | .02 | .00 | .00 | .01 | -.09* | .30* | .41* | .22* | .26* | -.18* | .08 | .51* | |
| 14. Multiple Identity | 568 | 4.40 | 1.36 | .19* | .19* | -.11* | -.16* | -.03 | .05 | .06 | .09* | .06 | -.13* | .17* | .22* | .17* |

Note. Heart = Heart Manikin, Valence = Valence Self-Assessment Manikin,

CESD = Center for Epidemiological Studies - Depression Scale

B.1.2 Study 1b

B.1.2.1 Correlations Table

Table B.2: Study 1b - Descriptive Statistics and Correlations among Variables

| Variable | <i>n</i> | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|--------------------------|----------|----------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1. Heart | 325 | 7.14 | 1.51 | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Valence | 325 | 6.51 | 1.45 | .62* | | | | | | | | | | | | | | | | | | | | | | |
| 3. SES | 325 | 7.16 | 1.46 | .08 | .18* | | | | | | | | | | | | | | | | | | | | | |
| 4. Social Isolation | 325 | 16.60 | 4.97 | -.40* | -.30* | -.18* | | | | | | | | | | | | | | | | | | | | |
| 5. Emotional Support | 325 | 36.12 | 4.57 | .48* | .31* | .04 | -.40* | | | | | | | | | | | | | | | | | | | |
| 6. Informational Support | 325 | 34.23 | 5.13 | .36* | .32* | .14* | -.35* | .67* | | | | | | | | | | | | | | | | | | |
| 7. Couples Satisfaction | 325 | 4.64 | 1.07 | .47* | .36* | .00 | -.27* | .44* | .24* | | | | | | | | | | | | | | | | | |
| 8. IOS | 325 | 4.90 | 1.28 | .28* | .21* | -.05 | -.07 | .25* | .16* | .52* | | | | | | | | | | | | | | | | |
| 9. Responsiveness | 325 | 4.39 | 0.78 | .42* | .30* | -.01 | -.24* | .44* | .22* | .79* | .48* | | | | | | | | | | | | | | | |
| 10. Conflict | 325 | 1.91 | 0.99 | -.25* | -.14* | .00 | .13* | -.18* | -.07 | -.58* | -.23* | -.51* | | | | | | | | | | | | | | |
| 11. Partner Ostracism | 325 | 1.65 | 0.54 | -.43* | -.30* | .03 | .26* | -.39* | -.30* | -.63* | -.48* | -.57* | .22* | | | | | | | | | | | | | |
| 12. Psychological Abuse | 325 | 1.24 | 0.30 | -.11 | -.08 | .12* | .21* | -.06 | -.03 | -.11* | .12* | -.12* | .33* | .00 | | | | | | | | | | | | |
| 13. Physical Abuse | 325 | 1.03 | 0.09 | .03 | .07 | -.04 | -.02 | .03 | -.04 | -.02 | .05 | -.02 | .10 | -.06 | .26* | | | | | | | | | | | |
| 14. Economic Control | 325 | 0.20 | 0.28 | -.14* | -.08 | -.04 | .21* | -.04 | -.08 | -.07 | -.04 | -.03 | .07 | .05 | .22* | .07 | | | | | | | | | | |
| 15. Threats | 325 | 0.04 | 0.12 | -.18* | -.09 | .06 | .19* | -.12* | -.10 | -.34* | -.11 | -.30* | .47* | .25* | .26* | .07 | .15* | | | | | | | | | |
| 16. Intimidation | 325 | 0.05 | 0.12 | -.03 | -.09 | -.02 | .02 | -.01 | -.14* | -.09 | -.05 | -.11 | .20* | .05 | .29* | .05 | .21* | .18* | | | | | | | | |
| 17. Emotional Control | 325 | 0.08 | 0.15 | -.13* | -.10 | .08 | .09 | -.08 | -.09 | -.21* | -.05 | -.23* | .31* | .14* | .43* | .15* | .29* | .33* | .33* | | | | | | | |
| 18. Isolation Control | 325 | 0.23 | 0.38 | -.10 | -.08 | .11 | .17* | -.08 | -.04 | -.16* | .06 | -.12* | .17* | .16* | .47* | .17* | .28* | .14* | .26* | .40* | | | | | | |
| 19. Craving | 325 | 2.47 | 0.81 | -.08 | -.13* | -.09 | .20* | -.04 | -.11 | .02 | -.02 | .11* | -.14* | .10 | -.05 | -.03 | .14* | -.07 | .05 | -.06 | .06 | | | | | |
| 20. Body Image | 325 | 3.86 | 1.34 | -.02 | .03 | -.07 | .02 | -.06 | -.11* | .14* | .12* | .16* | -.03 | -.05 | -.04 | .01 | .05 | -.02 | .06 | -.04 | -.04 | .27* | | | | |
| 21. Sleep | 325 | 11.95 | 1.59 | .07 | .06 | -.06 | -.02 | .03 | .03 | .13* | .14* | .16* | -.08 | -.11 | .13* | .05 | .08 | .05 | .05 | .09 | .06 | .10 | .01 | | | |
| 22. Narcissism | 325 | 2.64 | 1.31 | -.17* | -.15* | .12* | .13* | -.24* | -.17* | -.21* | .04 | -.17* | .10 | .17* | .16* | .10 | .15* | -.05 | .13* | .14* | .16* | .20* | -.06 | .01 | | |
| 23. Stress | 325 | 1.69 | 0.64 | -.45* | -.43* | -.09 | .49* | -.36* | -.35* | -.33* | -.16* | -.28* | .18* | .35* | .18* | .01 | .26* | .21* | .10 | .18* | .24* | .30* | .02 | -.05 | .19* | |
| 24. CESD | 325 | 0.85 | 0.54 | -.53* | -.46* | -.08 | .57* | -.47* | -.45* | -.42* | -.22* | -.38* | .16* | .46* | .18* | .03 | .18* | .20* | .11* | .14* | .21* | .25* | .07 | -.05 | .27* | .78* |

Note. Heart = Heart Manikin, Valence = Valence Self-Assessment Manikin, SES = Subjective Socioeconomic Status, IOS = Epidemiological Studies - Depression Scale

B.1.3 Study 1c (ARv1)

B.1.3.1 Correlations Table

Study 1b (RAIv1): Correlation Coefficients with the Heart Manikin across Visits 1–3

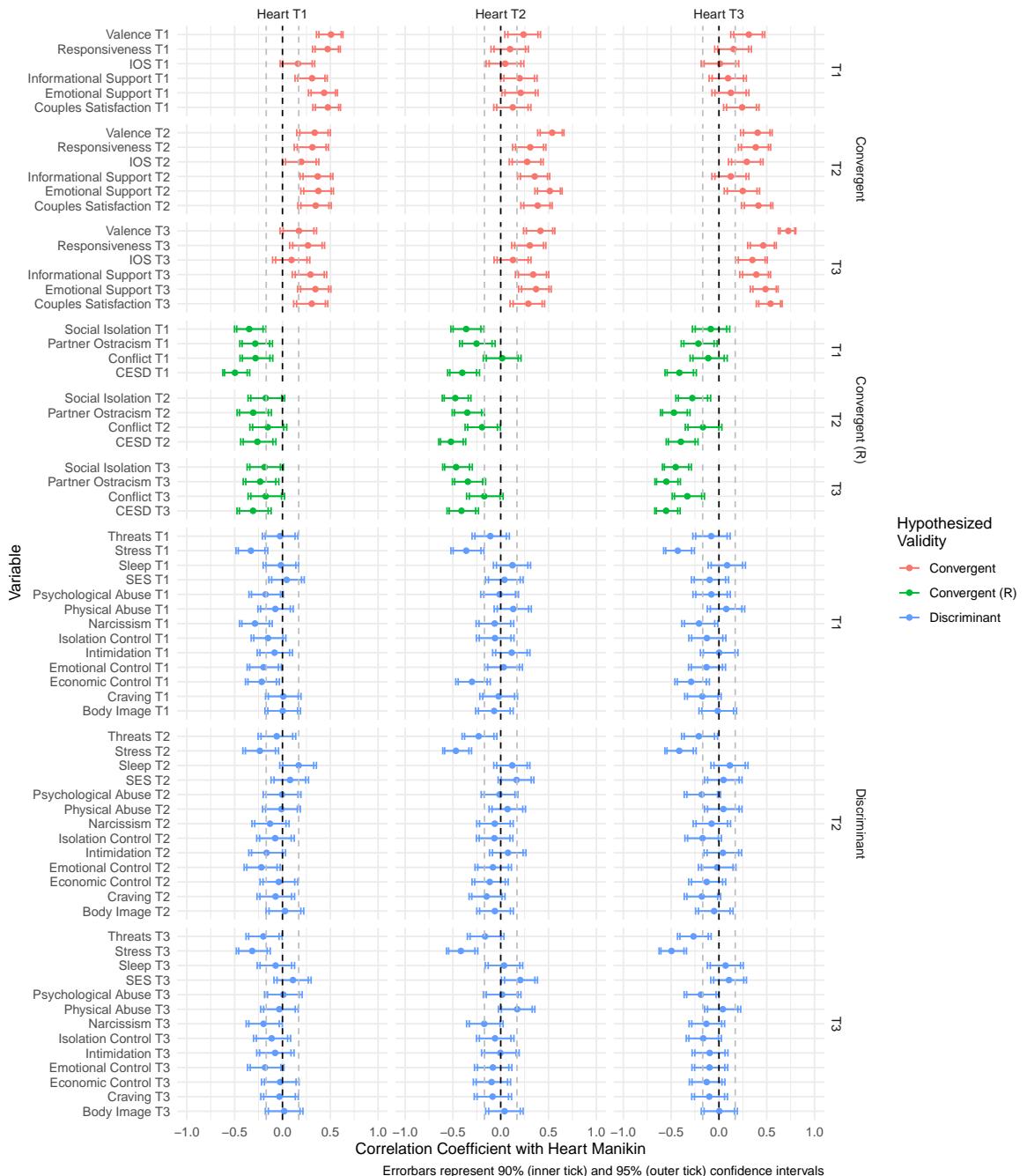


Figure B.1: Study 1b (RAIv1) - Forest plot of correlation coefficients of the measured variables with the Heart Manikin Scores

Table B.3: Study 1c - Descriptive Statistics and Correlations among Variables

| Variable | <i>n</i> | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---------------------------|----------|----------|-----------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
| 1. Heart T1 | 290 | 6.69 | 1.81 | | | | | | | | | | | | | |
| 2. Heart T2 | 290 | 5.11 | 2.96 | .12* | | | | | | | | | | | | |
| 3. Heart T3 | 290 | 6.64 | 2.39 | .66* | .48* | | | | | | | | | | | |
| 4. Valence T1 | 290 | 6.58 | 1.79 | .70* | .11 | .52* | | | | | | | | | | |
| 5. Valence T2 | 290 | 5.08 | 2.84 | .13* | .92* | .46* | .16* | | | | | | | | | |
| 6. Valence T3 | 290 | 7.00 | 2.64 | .51* | .42* | .73* | .53* | .43* | | | | | | | | |
| 7. Arousal T2 | 290 | 5.47 | 2.07 | .07 | .33* | .26* | .00 | .34* | .25* | | | | | | | |
| 8. Dominance T2 | 290 | 4.92 | 2.26 | .05 | .80* | .37* | .09 | .75* | .34* | .30* | | | | | | |
| 9. NTS Belonging T2 | 290 | 55.05 | 35.12 | .02 | .85* | .35* | -.01 | .85* | .31* | .28* | .68* | | | | | |
| 10. NTS Self-Esteem T2 | 290 | 53.24 | 31.42 | .08 | .80* | .37* | .08 | .80* | .36* | .25* | .71* | .84* | | | | |
| 11. NTS Control T2 | 290 | 39.24 | 26.52 | .06 | .64* | .33* | .09 | .63* | .28* | .21* | .68* | .58* | .71* | | | |
| 12. NTS Meaning T2 | 290 | 57.72 | 30.77 | .00 | .78* | .30* | -.03 | .75* | .29* | .29* | .65* | .87* | .83* | .60* | | |
| 13. NTS Overall T2 | 290 | 51.60 | 28.33 | .04 | .86* | .37* | .03 | .85* | .34* | .29* | .75* | .94* | .94* | .77* | .93* | |
| 14. SES T3 | 290 | 48.90 | 19.08 | .27* | .12* | .18* | .22* | .09 | .14* | .03 | .15* | .06 | .11 | .11 | .02 | .08 |

Note. Heart = the Heart Manikin, SES = Subjective Socioeconomic Status, IOS = Inclusion of the Other in the Self Scale, NTS = the Need-Threat Scale

B.1.3.2 Forestplot

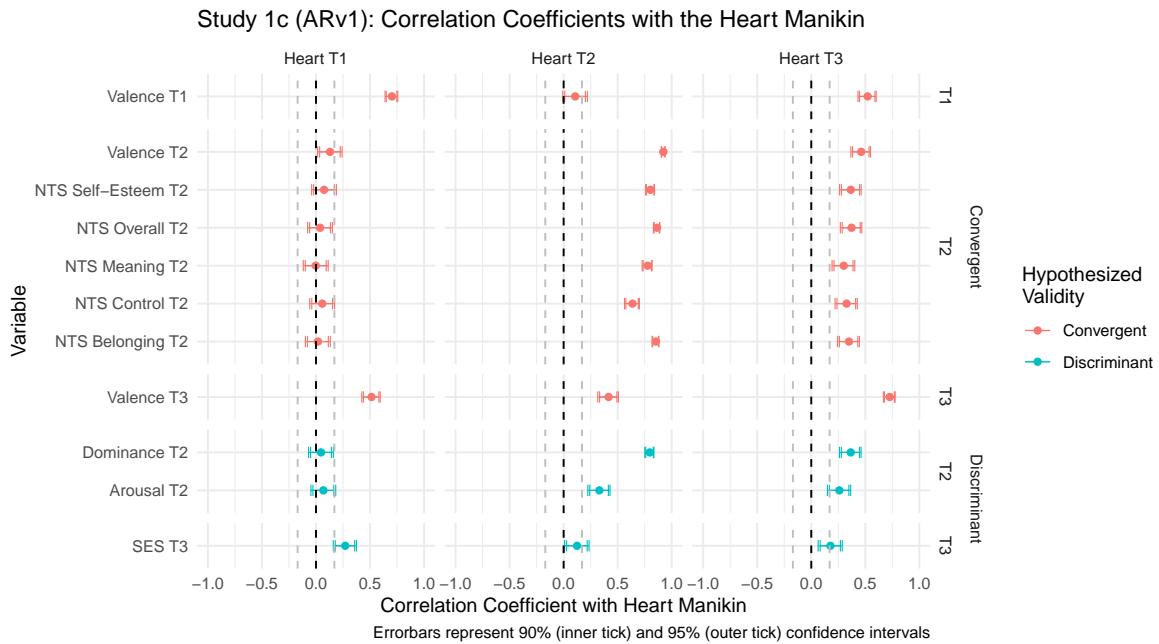


Figure B.2: Study 1c - Forestplot of Correlation Coefficients between the Measured Variables with the Heart Manikin

B.1.3.3 Heart & Valence Manikins Across Time

I explored whether the heart manikin scores changed across time by condition in a mixed model.

B.1.4 Study 1d (EVv1)

B.1.4.1 Correlations Table

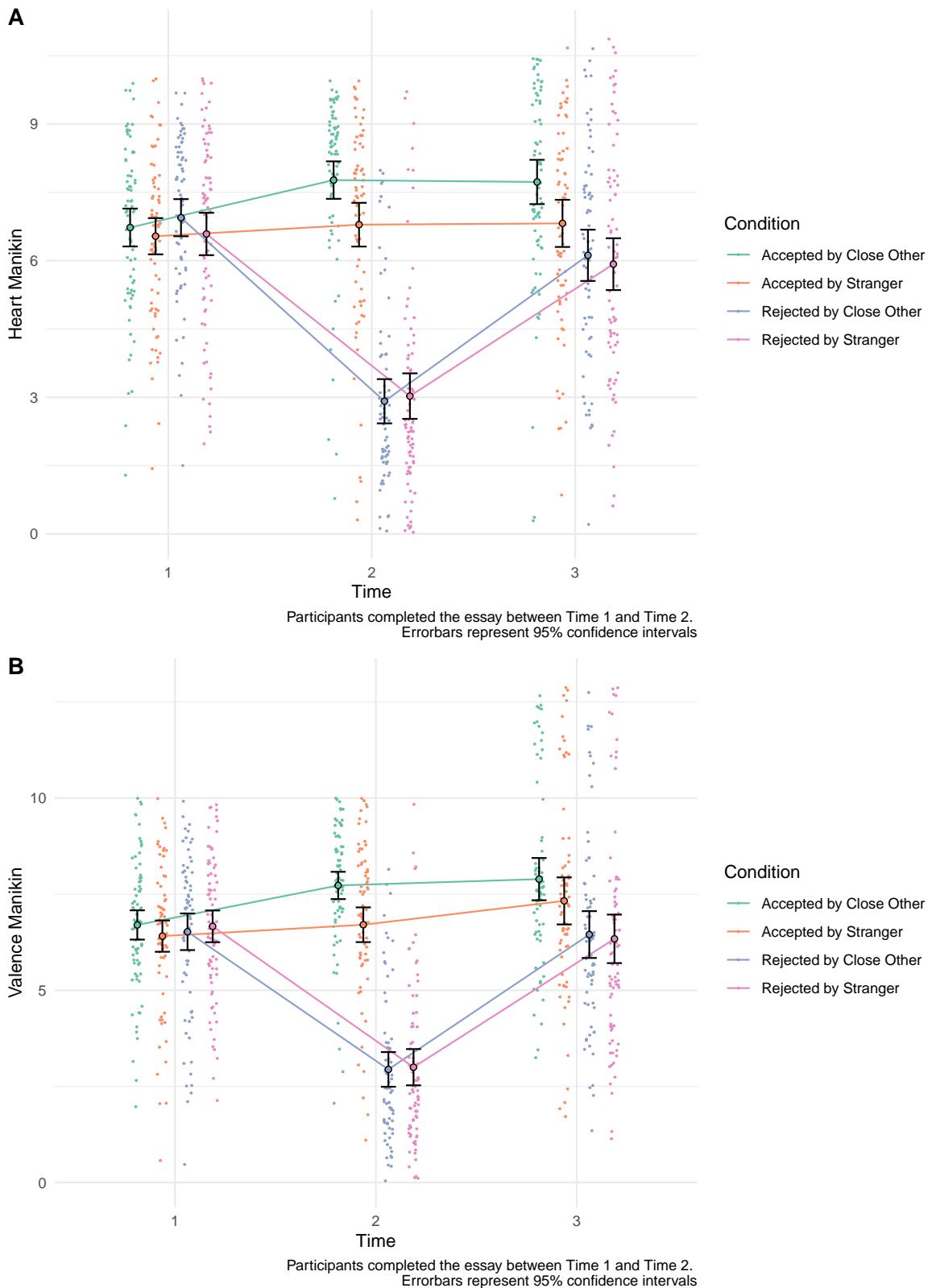


Figure B.3: Study 1c - Heart Manikin Scores Across Time and Conditions

Table B.4: Study 1d - Descriptive Statistics and Correlations among Variables

| Variable | <i>n</i> | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | | | | | | | | | |
|--------------------------------|----------|----------|-----------|------|------|------|------|------|------|------|------|-------|------|------|------|------|------|------|------|-------|-------|------|------|------|------|------|------|------|------|------|----|--|--|--|--|--|--|--|--|--|
| 1. Heart T1 | 242 | 6.57 | 1.79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Heart T2 | 242 | 6.63 | 1.60 | .84* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Heart T3 | 238 | 6.34 | 1.81 | .59* | .66* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Heart T4 | 237 | 6.37 | 1.64 | .70* | .80* | .74* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Valence T1 | 242 | 6.66 | 1.35 | .47* | .44* | .35* | .39* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. Valence T2 | 242 | 6.45 | 1.39 | .22* | .41* | .15* | .27* | .59* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. Valence T3 | 238 | 6.03 | 1.78 | .25* | .27* | .65* | .37* | .46* | .34* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. Valence T4 | 237 | 5.93 | 1.61 | .39* | .47* | .49* | .56* | .61* | .49* | .61* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. Arousal T1 | 242 | 4.05 | 1.48 | .09 | .12 | .04 | .07 | .24* | .25* | .25* | .25* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. Arousal T2 | 242 | 4.74 | 1.64 | .02 | .11 | -.05 | -.01 | .28* | .37* | .15* | .21* | .66* | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11. Arousal T3 | 238 | 4.74 | 1.74 | .01 | .04 | .17* | .05 | .21* | .17* | .38* | .30* | .59* | .72* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12. Arousal T4 | 237 | 4.79 | 1.71 | .13 | .18* | .09 | .12 | .26* | .30* | .27* | .34* | .61* | .73* | .74* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13. Dominance T1 | 242 | 6.23 | 1.50 | .31* | .31* | .23* | .34* | .30* | .23* | .17* | .35* | .07 | .11 | .12 | .14* | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14. Dominance T2 | 242 | 6.34 | 1.42 | .26* | .43* | .31* | .41* | .31* | .35* | .21* | .36* | .08 | .16* | .09 | .16* | .75* | | | | | | | | | | | | | | | | | | | | | | | | |
| 15. Dominance T3 | 238 | 6.21 | 1.53 | .16* | .29* | .51* | .44* | .24* | .25* | .49* | .43* | .04 | .04 | .18* | .13* | .62* | .69* | | | | | | | | | | | | | | | | | | | | | | | |
| 16. Dominance T4 | 237 | 6.23 | 1.51 | .27* | .37* | .40* | .54* | .30* | .20* | .33* | .55* | .06 | .05 | .08 | .14* | .61* | .71* | .67* | | | | | | | | | | | | | | | | | | | | | | |
| 17. Self-Esteem T1 | 241 | 1.54 | 0.96 | .57* | .57* | .43* | .49* | .41* | .32* | .30* | .35* | .03 | .05 | .03 | .06 | .30* | .34* | .31* | .34* | | | | | | | | | | | | | | | | | | | | | |
| 18. Need for Closure T1 | 238 | 0.33 | 0.76 | -.06 | -.07 | -.08 | -.04 | .03 | -.02 | -.08 | .01 | .02 | .12 | .08 | .09 | -.07 | -.04 | -.07 | -.09 | -.19* | | | | | | | | | | | | | | | | | | | | |
| 19. NTS Belonging T3 | 238 | 72.51 | 20.50 | .23* | .26* | .63* | .36* | .18* | -.01 | .57* | .27* | .00 | -.08 | .19* | .03 | .13* | .18* | .41* | .21* | .28* | -.18* | | | | | | | | | | | | | | | | | | | |
| 20. NTS Self-Esteem T3 | 238 | 69.90 | 19.48 | .28* | .31* | .61* | .43* | .28* | .09 | .61* | .37* | .09 | -.05 | .19* | .08 | .21* | .26* | .49* | .40* | .49* | -.20* | .71* | | | | | | | | | | | | | | | | | | |
| 21. NTS Control T3 | 238 | 49.46 | 21.11 | .06 | .13* | .31* | .23* | .13* | .11 | .35* | .30* | .04 | .02 | .17* | .08 | .16* | .27* | .42* | .34* | .27* | -.14* | .48* | .54* | | | | | | | | | | | | | | | | | |
| 22. NTS Meaning T3 | 238 | 76.45 | 18.00 | .33* | .33* | .64* | .41* | .28* | .06 | .59* | .31* | .10 | -.01 | .23* | .10 | .15* | .19* | .43* | .29* | .45* | -.15* | .76* | .79* | .45* | | | | | | | | | | | | | | | | |
| 23. NTS Overall T3 | 238 | 65.27 | 16.65 | .25* | .30* | .60* | .41* | .27* | .11 | .60* | .39* | .09 | -.02 | .23* | .10 | .20* | .28* | .52* | .40* | .47* | -.19* | .75* | .90* | .80* | .86* | | | | | | | | | | | | | | | |
| 24. NTS Belonging T4 | 237 | 75.65 | 16.70 | .31* | .38* | .55* | .54* | .24* | .10 | .41* | .41* | .07 | -.07 | .08 | .03 | .17* | .25* | .40* | .43* | .43* | -.20* | .61* | .62* | .37* | .63* | .62* | | | | | | | | | | | | | | |
| 25. NTS Self-Esteem T4 | 237 | 66.59 | 20.17 | .28* | .42* | .41* | .52* | .28* | .23* | .26* | .46* | .06 | -.04 | .01 | .04 | .22* | .31* | .36* | .54* | .47* | -.15* | .28* | .55* | .35* | .38* | .50* | .67* | | | | | | | | | | | | | |
| 26. NTS Control T4 | 237 | 51.86 | 22.80 | .18* | .28* | .26* | .37* | .25* | .19* | .14* | .35* | .09 | .03 | .06 | .04 | .24* | .31* | .31* | .45* | .37* | -.16* | .19* | .40* | .57* | .27* | .49* | .44* | .65* | | | | | | | | | | | | |
| 27. NTS Meaning T4 | 237 | 77.25 | 16.49 | .30* | .40* | .51* | .53* | .22* | .11 | .39* | .43* | .09 | -.01 | .10 | .08 | .19* | .29* | .40* | .50* | .46* | -.12 | .46* | .57* | .35* | .58* | .58* | .80* | .72* | .48* | | | | | | | | | | | |
| 28. NTS Overall T4 | 237 | 68.44 | 15.95 | .31* | .43* | .50* | .58* | .29* | .19* | .35* | .48* | .09 | -.03 | .07 | .05 | .24* | .34* | .43* | .56* | .51* | -.19* | .45* | .63* | .49* | .54* | .65* | .85* | .89* | .78* | .87* | | | | | | | | | | |
| 29. Social Judgement Survey T4 | 237 | 418.70 | 226.03 | .01 | -.07 | .00 | -.05 | .00 | -.08 | -.04 | -.01 | -.15* | -.12 | -.09 | -.06 | .13* | .11 | .04 | .11 | .00 | .07 | .01 | -.01 | -.06 | -.03 | -.03 | .01 | .01 | -.02 | -.01 | | | | | | | | | | |

Note. Heart = the Heart Manikin, NTS = the Need-Threat Scale

B.1.4.2 Forestplot

B.1.4.3 Heart Manikin Across Time

B.1.5 Study 1e (NPSv2)

B.1.5.1 Correlations Table

Study 1d (EVv1) – Correlation Coefficients with the Heart Manikin

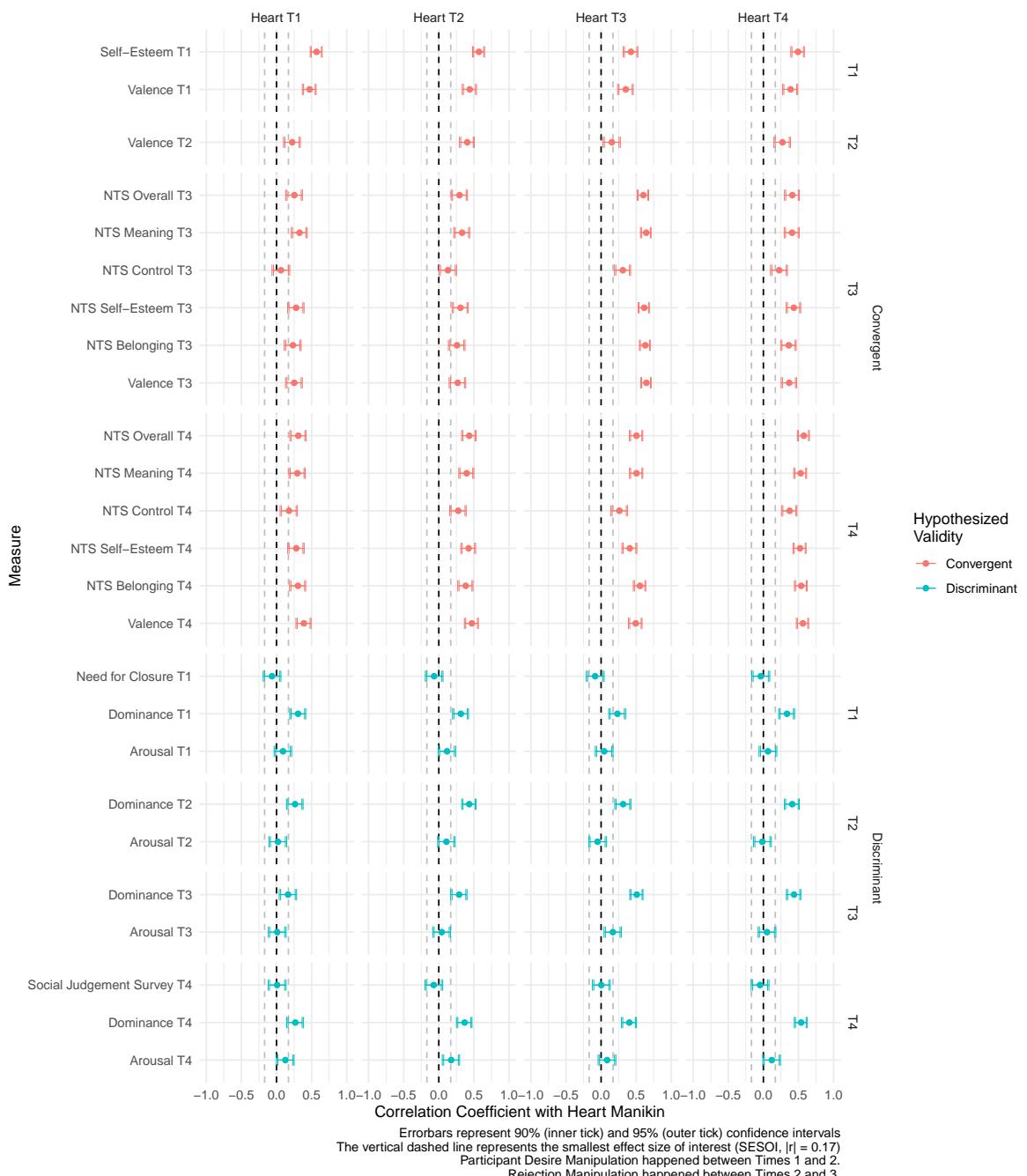


Figure B.4: Study 1d - Forestplot of Correlation Coefficients between the Measured Scores and the Heart Manikin

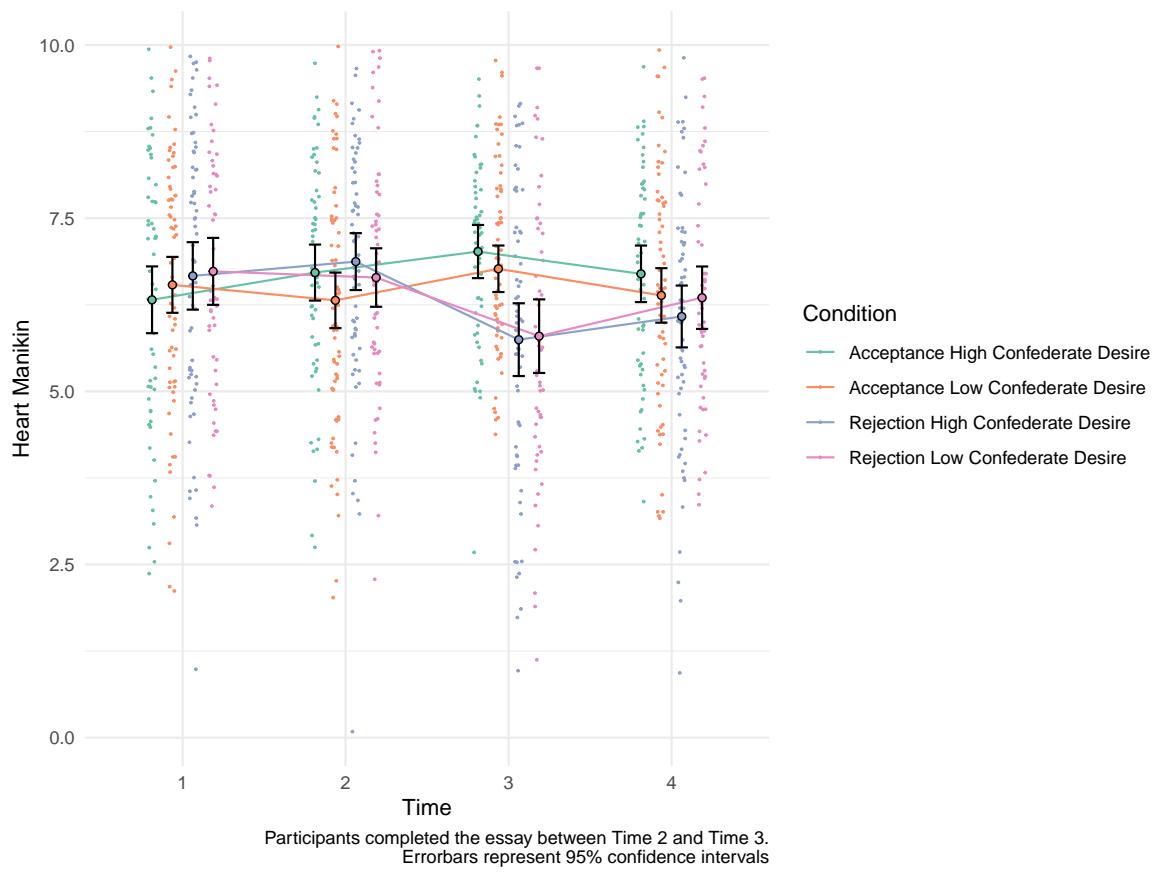


Figure B.5: Study 1d - Heart Manikin Across Time

Table B.5: Study 1e - Descriptive Statistics and Correlation Coefficients

Note. Heart = the Heart Manikin, NTS = the Need-Threat Scale

B.1.5.2 Forestplot

B.1.5.3 Heart Manikin Scores Across Time

I explored whether participants reported different levels of belonging across time, depending on the experimental conditions. Figure B.7 shows the Heart Manikin scores across time and the conditions.

I also explored whether participants reported different levels of need-threat between Time 3 and Time 5. Results are plotted in Figure B.8

I explored whether participants with higher (vs. lower) self-esteem reported different levels of need-threat at Time 5 (after rejection) in a regression model (predictors: the main effect of rejection, the main effect of self-esteem, and the interaction between rejection and self-esteem). Figure B.9 shows the results. I did not find evidence of moderation by self-esteem for the effect of social rejection.

B.2 Study 2

B.2.1 Correlations Table

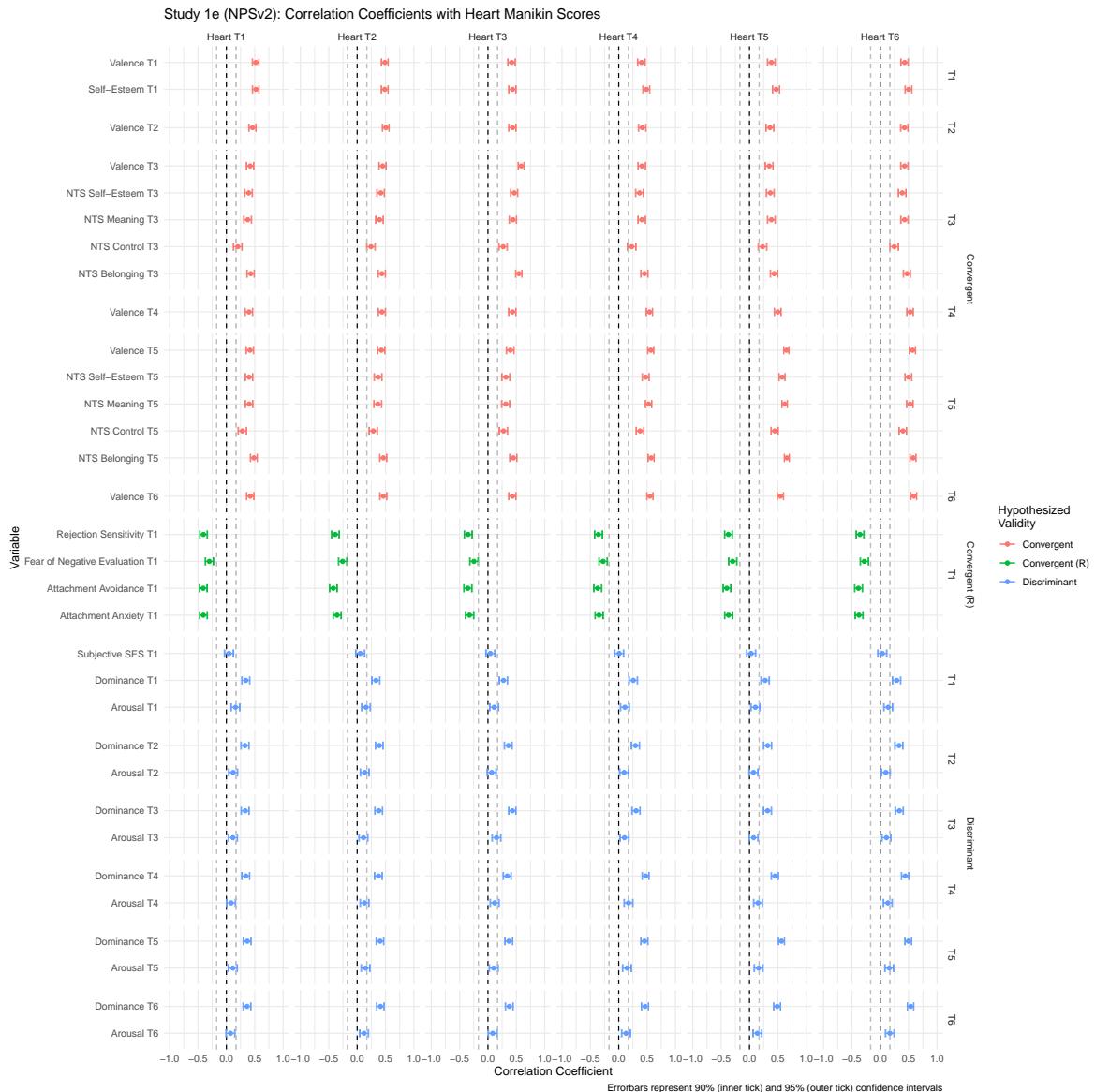


Figure B.6: Study 1e - Forestplot of Correlations between the Measured Variables and the Heart Manikin Scores

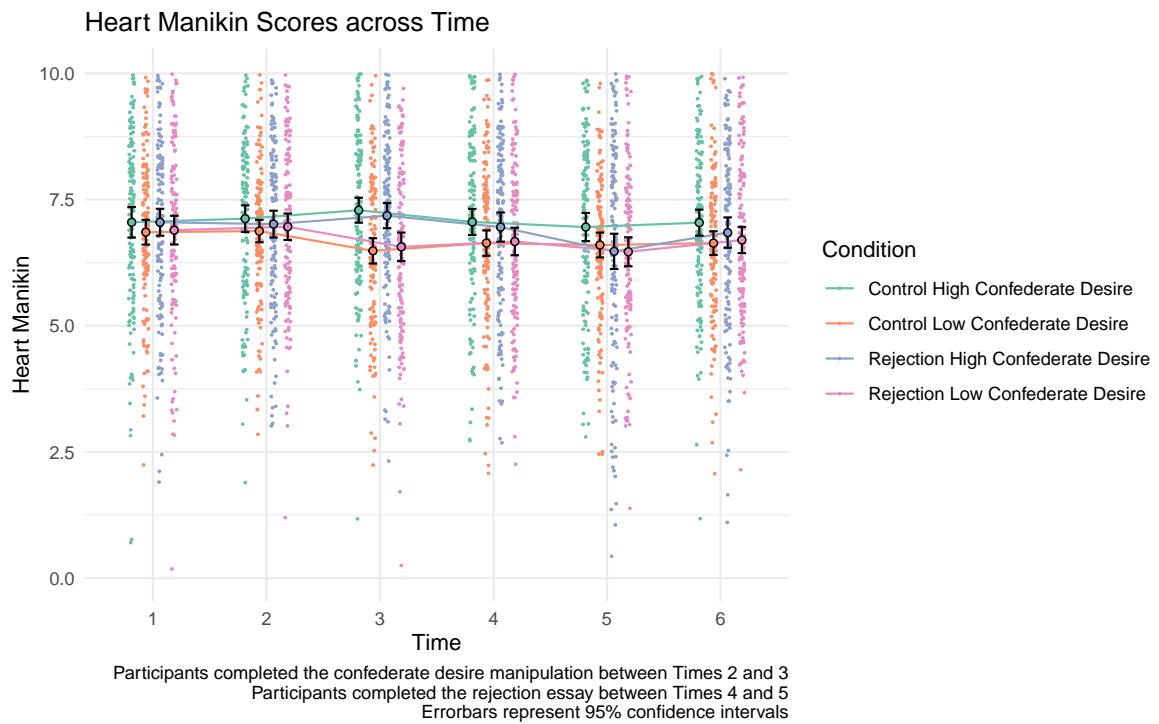


Figure B.7: Study 1e - Heart Manikin Scores

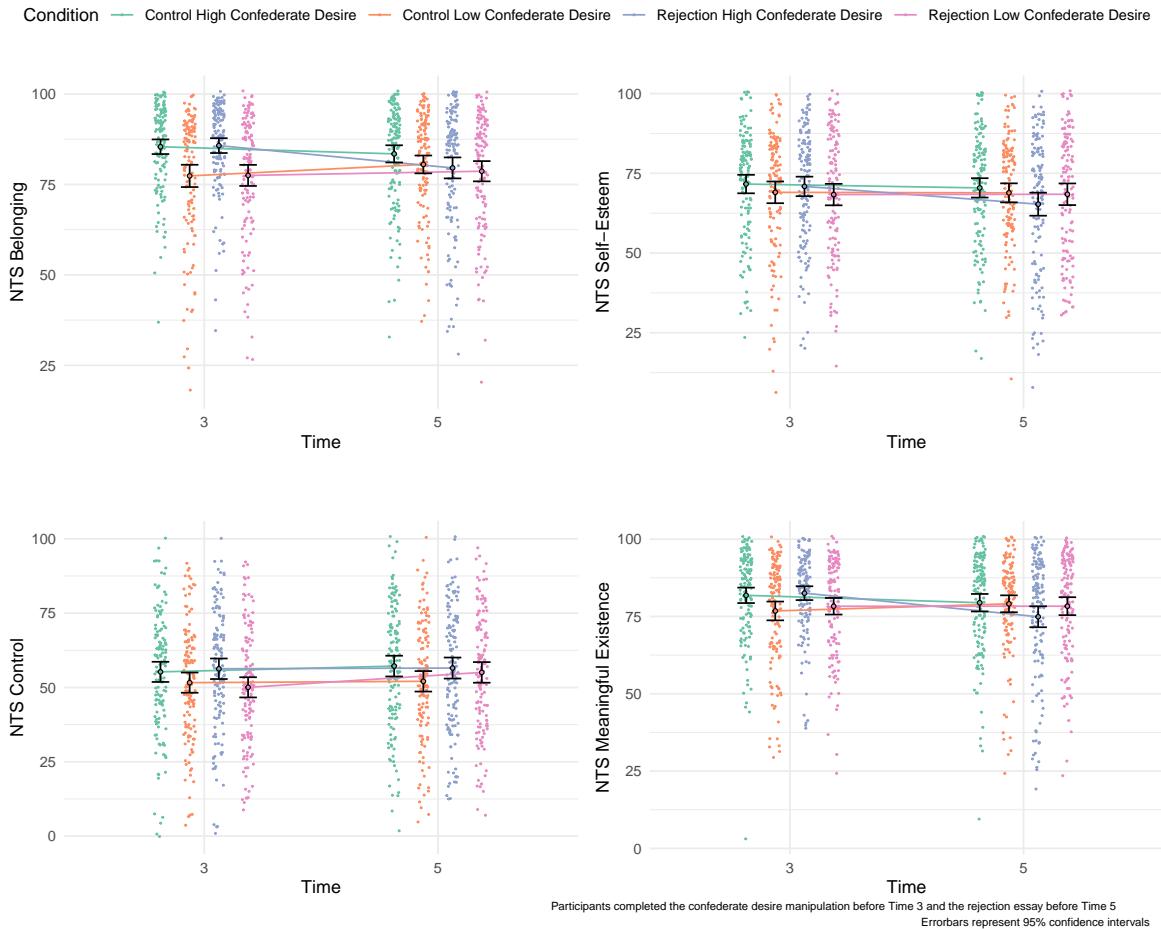


Figure B.8: Need-Threat Scores Across Time and Condition

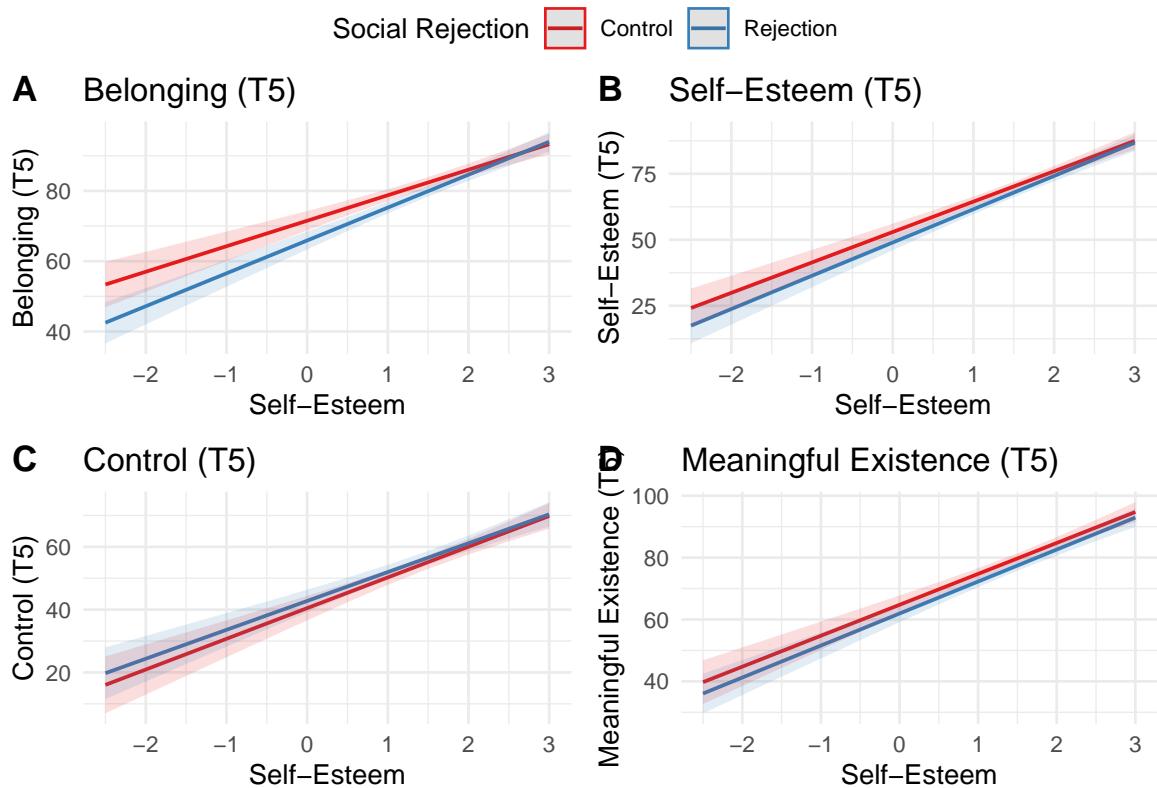


Figure B.9: Study 1e - Self-Esteem as a Possible Moderator for the Effect of Rejection on Need-Threat

Table B.6: Bivariate Correlations Among the Measures in Study 2

| Variable | <i>n</i> | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|--------------------|----------|----------|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1. Heart (T1) | 359 | 6.21 | 1.98 | | | | | | | | | | | | | |
| 2. Heart (T2) | 359 | 6.32 | 1.91 | .77* | | | | | | | | | | | | |
| 3. Valence (T1) | 359 | 5.93 | 1.89 | .72* | .62* | | | | | | | | | | | |
| 4. Valence (T2) | 359 | 6.25 | 1.76 | .57* | .74* | .71* | | | | | | | | | | |
| 5. Arousal (T1) | 359 | 4.22 | 1.69 | .06 | .06 | .16* | .09 | | | | | | | | | |
| 6. Arousal (T2) | 359 | 4.92 | 1.89 | .00 | .13* | .08 | .19* | .58* | | | | | | | | |
| 7. Dominance (T1) | 359 | 5.83 | 1.65 | .30* | .31* | .31* | .30* | .14* | .19* | | | | | | | |
| 8. Dominance (T2) | 359 | 6.10 | 1.63 | .27* | .38* | .27* | .39* | .08 | .25* | .85* | | | | | | |
| 9. IOS | 211 | 3.07 | 1.76 | -.13 | -.04 | -.04 | .07 | -.03 | .13 | .13 | .12 | | | | | |
| 10. PSI | 210 | 2.21 | 0.71 | -.11 | -.04 | -.03 | .12 | -.10 | .17* | -.01 | .01 | .60* | | | | |
| 11. Narrative Eng. | 357 | 0.63 | 0.87 | .00 | -.01 | .06 | .08 | .04 | .13* | -.01 | .03 | .27* | .37* | | | |
| 12. Immersion | 359 | 1.92 | 1.24 | .08 | .14* | .12* | .22* | -.05 | .10 | .08 | .14* | .24* | .29* | .40* | | |
| 13. Social World | 358 | -0.12 | 1.82 | .02 | .05 | .05 | .15* | -.04 | .13* | -.02 | .04 | .48* | .57* | .41* | .28* | |
| 14. Enjoyment | 359 | 2.31 | 0.72 | .11* | .15* | .16* | .29* | -.02 | .06 | .13* | .15* | .21* | .27* | .37* | .41* | .31* |

Note. The Ns for IOS and PSI are smaller since only people who indicated they interacted with a non-player character saw these questions. IOS = Inclusion of the Other in Self Scale. PSI = Parasocial Interaction-Process Scale. Narrative Eng. = Narrative Engagement.

B.2.2 Bivariate Scatter Plot Matrix

B.2.3 World Cloud for Reported games

B.2.4 Main Analysis with Excluded Participants

In the main analysis, I excluded participants based on the preregistered exclusion procedure. Here, I report results including all participants. I used the entire dataset including excluded participants to perform Welch's *t*-test to compare the post-essay Heart Manikin scores (Time 2) between the participants who wrote about the social surrogacy video game and those who wrote about the non-social surrogacy video game. Results were consistent with the analysis without the excluded participants: participants who wrote about the social surrogacy game () reported similar levels of belonging compared with those who wrote about a non-surrogacy game (, $t(417.2) = -0.35$, $p = .724$).

B.2.5 Natural Language Processing for Essays

I used natural language processing to explore words used in the video game essays. Figure B.13 shows the proportion of the words used within each essay conditions. Words such as “character” and “story” appeared more frequently in the social surrogate essays compared to non-social surrogate essays. On the other hand, words such as “cards,” “goal” appeared more frequently in the non-social surrogate essays than in social surrogate essays.

B.2.6 Exit Questions

Participants saw two debrief questions, one referring to the purpose of the study, and another asking them to share anything about the study. I presented the debriefing questions in a randomized order to explore whether participants provided different amount of information if they were asked about the purpose of the study first, or they were asked to share anything. Results are presented in Figure B.14. In writing about

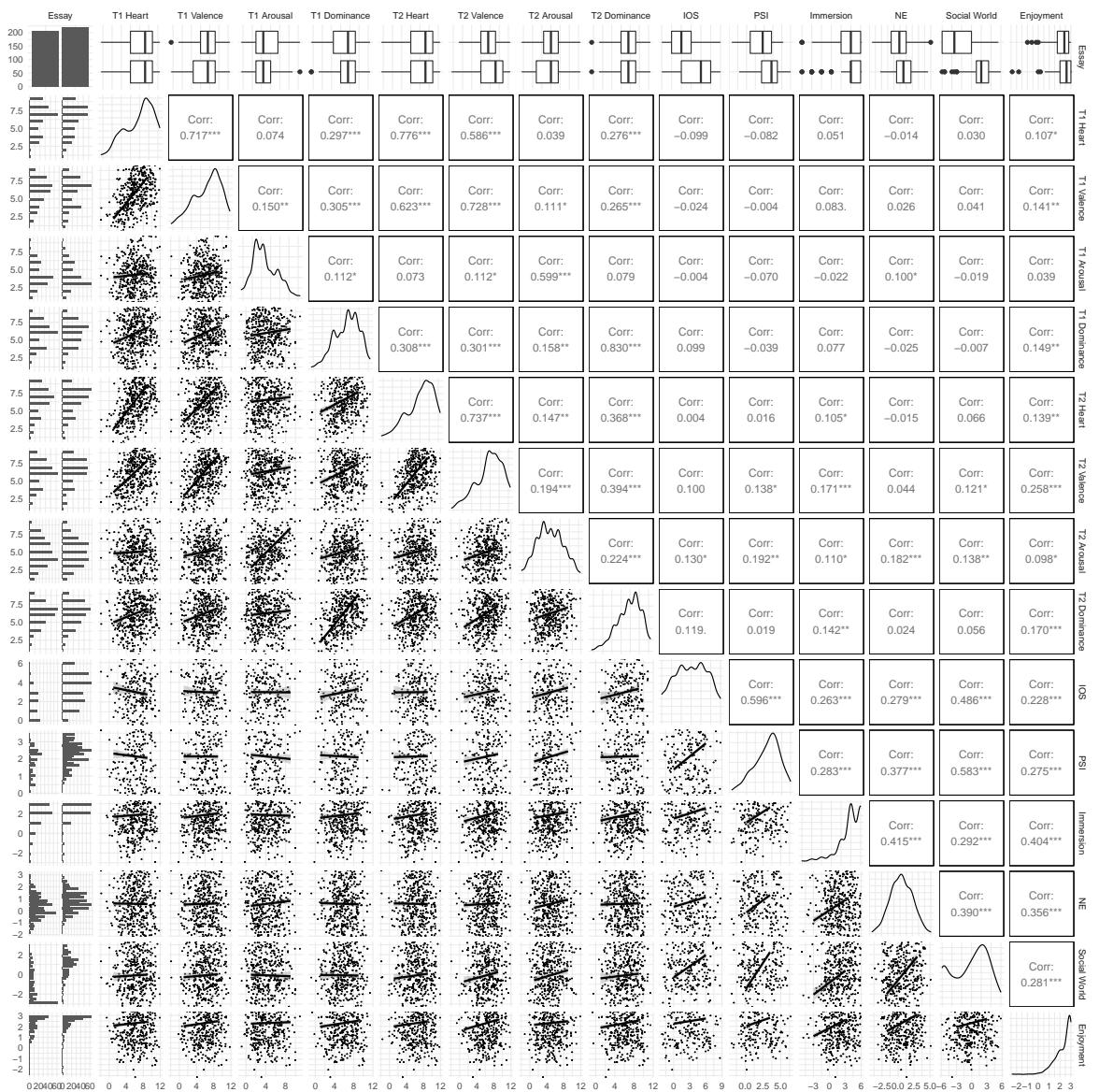


Figure B.10: Matrix Plot for Study 2 Variables



Figure B.11: Word Cloud for Game Titles for the Social Surrogate Condition



Figure B.12: Word Cloud for Game Titles for the Non-Social Surrogate Condition

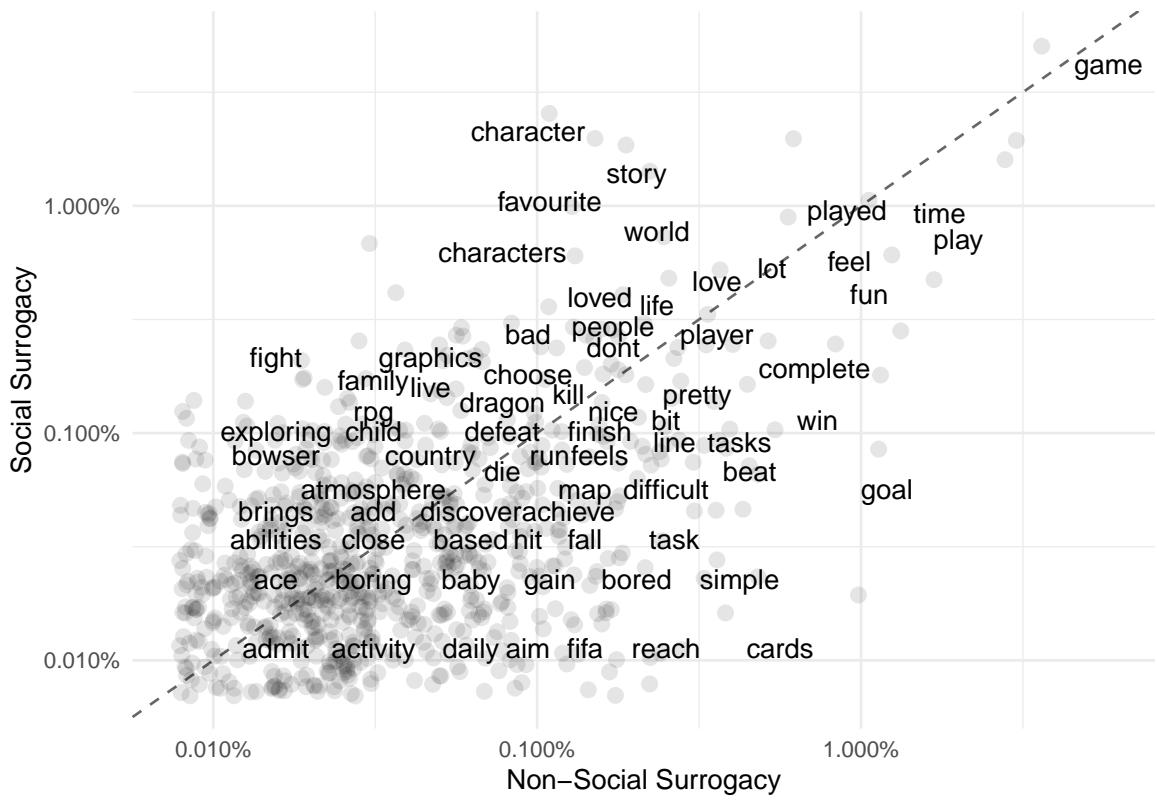


Figure B.13: Proportions of Words Used in Participants Essays Within Each Video Game Conditions. Words along the dashed line appeared equally in across social surrogacy and non-social surrogacy conditions. Words in the upper diagonal appeared more frequently in the social surrogacy condition than in the non-social surrogacy condition. Words in the lower diagonal appeared more frequently in the non-social surrogacy condition.

the purpose of the study, participants who were asked about the purpose of the study first left a longer answer than those who were asked to share anything first.

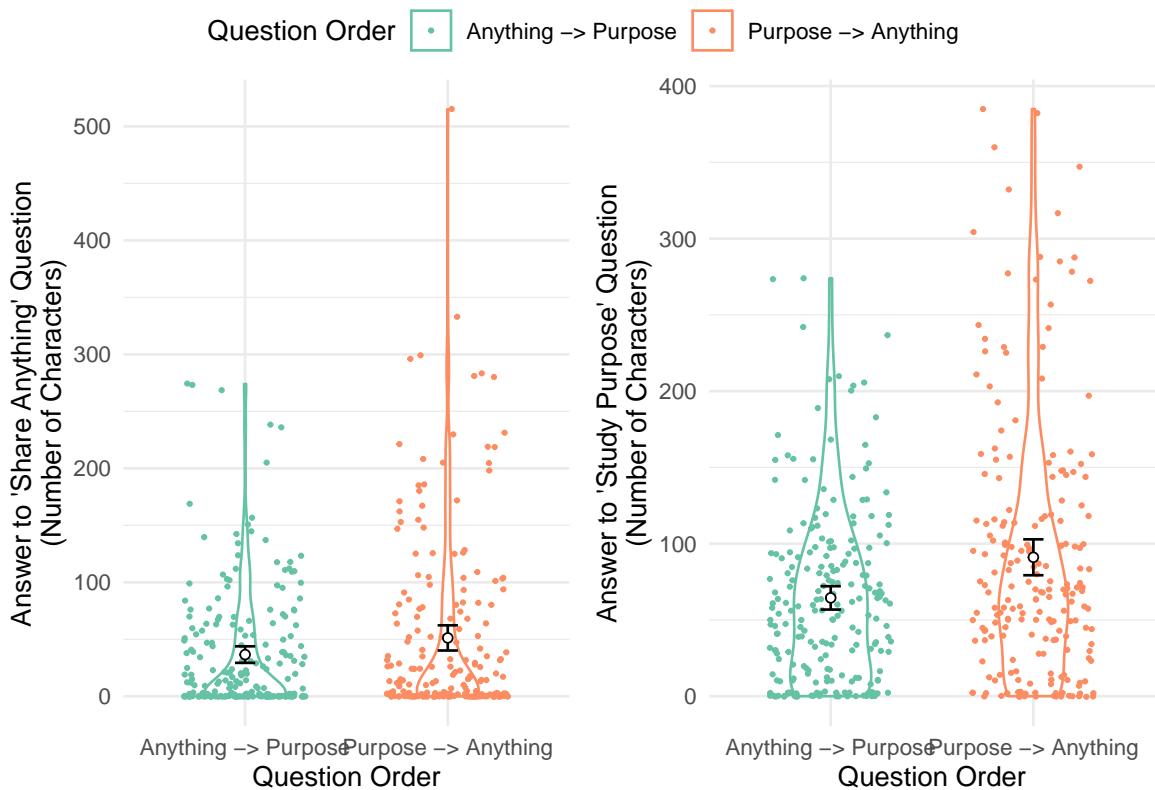


Figure B.14: Study 2 - Lengths of Participant Answers to Exit Questions Across Question Order

B.3 Study 3

B.3.1 Correlations Table

Table B.7: Bivariate Correlations among the Measures in Study 3

| Variable | <i>n</i> | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|----------------------|----------|----------|-----------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1. Heart (T1) | 344 | 6.45 | 1.90 | | | | | | | | | | | | |
| 2. Heart (T2) | 344 | 6.24 | 1.87 | .66* | | | | | | | | | | | |
| 3. Valence (T1) | 344 | 6.00 | 1.91 | .65* | .46* | | | | | | | | | | |
| 4. Valence (T2) | 344 | 5.64 | 2.30 | .28* | .57* | .33* | | | | | | | | | |
| 5. Arousal (T1) | 344 | 4.24 | 1.76 | .28* | .21* | .32* | .22* | | | | | | | | |
| 6. Arousal (T2) | 344 | 5.01 | 1.97 | .17* | .33* | .17* | .52* | .43* | | | | | | | |
| 7. Dominance (T1) | 343 | 6.04 | 1.63 | .33* | .28* | .33* | .16* | .15* | .07 | | | | | | |
| 8. Dominance (T2) | 343 | 6.25 | 1.72 | .19* | .51* | .18* | .49* | .11* | .29* | .51* | | | | | |
| 9. IOS | 272 | 2.81 | 1.72 | .08 | .15* | .06 | .27* | .14* | .26* | .08 | .29* | | | | |
| 10. Immersion | 344 | 0.21 | 1.81 | .10 | .33* | .11* | .53* | .10 | .33* | -.04 | .27* | .32* | | | |
| 11. Social World | 337 | -0.23 | 1.52 | .13* | .33* | .10 | .53* | .11* | .35* | -.02 | .31* | .32* | .77* | | |
| 12. | 315 | -0.90 | 0.96 | .07 | .24* | .07 | .39* | .18* | .30* | .05 | .27* | .34* | .50* | .60* | |
| Identification | | | | | | | | | | | | | | | |
| 13. Enjoyment | 342 | -0.43 | 1.62 | .03 | .28* | .04 | .55* | -.01 | .31* | -.08 | .29* | .25* | .71* | .79* | .63* |

Note. * $p < .05$. IOS = Inclusion of the Other in Self Scale. The N of IOS is smaller since only those interacted with an NPC answered this question. The Ns for dominance, social world, identification, and enjoyment are smaller due to programming errors and participants skipping questions.

B.3.2 Bivariate Scatter Matrix

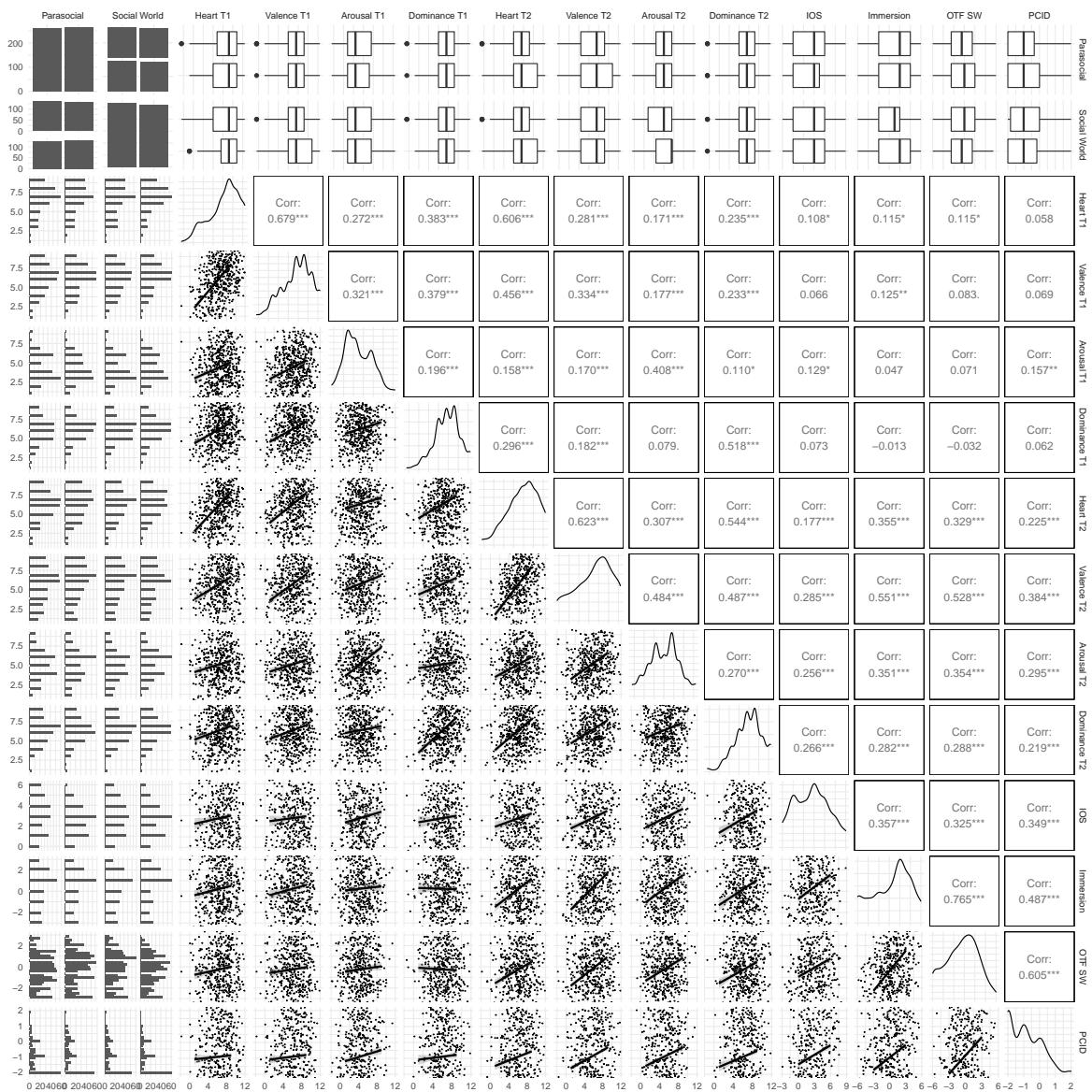


Figure B.15: Study 3 - Bivariate Scatter Plot Matrix

Appendix C
INSTITUTIONAL REVIEW BOARD APPROVAL LETTERS



Institutional Review Board
210H Hullihen Hall
Newark, DE 19716
Phone: 302-831-2137
Fax: 302-831-2828

DATE: January 19, 2021
TO: Naoyuki Sunami
FROM: University of Delaware IRB
STUDY TITLE: [1670458-1] Understanding Thoughts and Feelings while Playing Video Games (VIBv1)
SUBMISSION TYPE: New Project
ACTION: DETERMINATION OF EXEMPT STATUS
EFFECTIVE DATE: January 19, 2021
REVIEW CATEGORY: Exemption category # (3)

Thank you for your New Project submission to the University of Delaware Institutional Review Board (UD IRB). According to the pertinent regulations, the UD IRB has determined this project is EXEMPT from most federal policy requirements for the protection of human subjects. The privacy of subjects and the confidentiality of participants must be safeguarded as prescribed in the reviewed protocol form.

This exempt determination is valid for the research study as described by the documents in this submission. Proposed revisions to previously approved procedures and documents that may affect this exempt determination must be reviewed and approved by this office prior to initiation. The UD amendment form must be used to request the review of changes that may substantially change the study design or data collected.

Unanticipated problems and serious adverse events involving risk to participants must be reported to this office in a timely fashion according with the UD requirements for reportable events.

A copy of this correspondence will be kept on file by our office. If you have any questions, please contact the UD IRB Office at (302) 831-2137 or via email at hsrb-research@udel.edu. Please include the study title and reference number in all correspondence with this office.

INSTITUTIONAL REVIEW BOARD

www.udel.edu



Institutional Review Board
210H Hullihen Hall
Newark, DE 19716
Phone: 302-831-2137
Fax: 302-831-2828

DATE: February 19, 2021

TO: Naoyuki Sunami
FROM: University of Delaware IRB

STUDY TITLE: [1670458-2] Understanding Thoughts and Feelings while Playing Video Games (VIBv1)

SUBMISSION TYPE: Amendment/Modification

ACTION: DETERMINATION OF EXEMPT STATUS
EFFECTIVE DATE: February 19, 2021

REVIEW CATEGORY: Exemption category # (3)

Thank you for your Amendment/Modification submission to the University of Delaware Institutional Review Board (UD IRB). According to the pertinent regulations, the UD IRB has determined this project is EXEMPT from most federal policy requirements for the protection of human subjects. The privacy of subjects and the confidentiality of participants must be safeguarded as prescribed in the reviewed protocol form.

This exempt determination is valid for the research study as described by the documents in this submission. Proposed revisions to previously approved procedures and documents that may affect this exempt determination must be reviewed and approved by this office prior to initiation. The UD amendment form must be used to request the review of changes that may substantially change the study design or data collected.

Unanticipated problems and serious adverse events involving risk to participants must be reported to this office in a timely fashion according with the UD requirements for reportable events.

A copy of this correspondence will be kept on file by our office. If you have any questions, please contact the UD IRB Office at (302) 831-2137 or via email at hsrb-research@udel.edu. Please include the study title and reference number in all correspondence with this office.

INSTITUTIONAL REVIEW BOARD

www.udel.edu