

ABSTRACT

Title of Thesis: SELF-PROTECTIVE EPISODIC
SIMULATIONS MOTIVATE NEGATIVE
SOCIAL BEHAVIORS IN LONELY PEOPLE

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Loneliness can be an enduring condition, with the stability of loneliness comparable to that of a personality trait. The Evolutionary Theory of Loneliness (ETL) posits that loneliness is a self-perpetuating condition; lonely people prioritize self-protection over connecting with others. To self-protect, lonely people engage in increased hostility and avoidance and decreased prosocial behaviors. Engaging in these behaviors perpetuates their loneliness by eroding their social networks. I hypothesize that self-protective episodic simulations of rejection may be an underlying mechanism that drives negative social behaviors. To assess the effects of episodic simulations on the stability of loneliness, I conducted a longitudinal assessment of participants' unmanipulated episodic simulations of social interactions and ratings of loneliness. Participants were 207 undergraduate students at the University of Maryland who completed up to four sequential weekly assessments. Multilevel modeling was used to assess within subjects change in social behaviors, social

perceptions, and episodic simulations. I found evidence to support episodic simulations of rejection predicted next week's prosocial behaviors, social avoidance, and hostility. Prosocial behaviors and hostility, in turn, predicted loneliness. I did not find evidence to support the hypothesis that loneliness predicts the following week's hostility. The results highlight the potential influence episodic simulations of rejection have on social behaviors and loneliness. Contrary to ETL, I did not find any support for the hypothesis that loneliness predicts future hostility.

SELF-PROTECTIVE EPISODIC SIMULATIONS MOTIVATE NEGATIVE
SOCIAL BEHAVIORS IN LONELY PEOPLE

by

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Chapter 1: Introduction

1.1 Overview

Throughout history, people have demonstrated an innate desire to belong to groups for survival and social assistance benefits. This need to belong exists in nearly everyone (Baumeister & Leary, 1995). However, one's need to belong is not always satisfied. When the need to belong is frustrated, people often experience loneliness. Loneliness is the feeling of distress caused by the perception that one's social network does not satisfy one's need for social connection (Hawkley & Cacioppo, 2010).

The prevalence of loneliness substantially increased worldwide during the COVID-19 pandemic (Ernst et al., 2022). The widespread use of quarantines and social distancing controlled the spread of COVID-19. It also imposed social isolation, which may partly explain the observed increase in loneliness (Loades et al., 2020; Luchetti et al., 2020). However, loneliness was a pervasive problem prior to the COVID-19 pandemic; in industrialized nations, between 25%-50% of people reported feeling lonely at least some of the time, and 5%-10% of people reported feeling lonely frequently or always (J. T. Cacioppo & Cacioppo, 2018b). For some, loneliness can be an enduring aspect of their life, with the stability of loneliness comparable to that of a personality trait (J. T. Cacioppo & Hawkley, 2005; Jones et al., 1982). The Evolutionary Theory of Loneliness (ETL) posits that loneliness can be stable over time because loneliness is a self-perpetuating condition (J. T. Cacioppo & Cacioppo, 2018a). Negatively biased perceptions of the self and others during social interactions may sustain loneliness (Cacioppo & Cacioppo, 2018a). The ETL postulates that negative biases arise in lonely people because they have impoverished

social support networks, which can bias them to perceive their social world as dangerous (Cacioppo & Cacioppo, 2018a). This assumption of danger can engender a vigilance for social threats that can motivate lonely people to prioritize self-protection over connecting with others (J. T. Cacioppo et al., 2014, 2015; Gollwitzer et al., 2018; Masi et al., 2011).

Prioritizing self-protection can lead lonely people to respond negatively toward others (Hawkley & Cacioppo, 2010). Specifically, lonely people are more likely to engage in hostile (J. T. Cacioppo et al., 2000) and avoidant (J. T. Cacioppo et al., 2000; Watson & Nesdale, 2012) behaviors and are less likely to engage in prosocial behaviors (Huang et al., 2016; Lanser & Eisenberger, 2022; Yin & Lee, 2023). Increased hostile and avoidant behaviors and decreased prosocial behaviors may further erode the social networks of lonely people (Amato, 1990; Hawkley & Cacioppo, 2010; Lanser & Eisenberger, 2022). I hypothesize that self-protective episodic simulations of interpersonal rejection partially motivate these negative social behaviors.

Episodic simulations are the mental processes of envisioning a future event in time and space, and they include specific details about the event. Details may include the individuals involved, the actions and potential motivations of the actors, the location, and the emotions of the people present (Schacter et al., 2008, 2017). I hypothesize that increased self-protection motivations associated with loneliness will increase the likelihood of having episodic simulations of interpersonal rejection. Self-protection motivations have been found to contribute to increased threat perceptions (Maner et al., 2005). Hence, it is plausible that the increased self-protection

motivation accompanying loneliness motivates lonely people to simulate interpersonal rejection, as doing so could help them predict, prevent, and respond to this rejection.

This thesis will examine the mediating effect of self-protective episodic simulations of interpersonal rejection in the association between loneliness and interpersonal behavior.

Specifically, I expect to find that loneliness will motivate self-protection motivations, which will predict increased episodic simulations of interpersonal rejection. These episodic simulations of interpersonal rejection are expected to predict increased hostile and avoidant behaviors and decreased prosocial behaviors in lonely people. In turn, these behaviors may predict subsequent loneliness. This work extends the ETL by identifying a novel bias in how lonely people cognitively represent future social interactions and examining its implications for interpersonal behavior associated with loneliness and the stability of loneliness over time.

1.2 Loneliness, Vigilance to Social Threats, and Self-Protection Motivation

Fundamentally, loneliness is dissatisfaction with one's current social world (Cacioppo & Cacioppo, 2018a). From an evolutionary viewpoint, loneliness functions similarly to physical pain. Physical pain signals a problem in the body; loneliness signals something a problem in one's social world (J. T. Cacioppo et al., 2014). In other words, loneliness can function as a signal to seek out social connections to strengthen social ties (J. T. Cacioppo & Hawkley, 2009). However, loneliness also engenders an underlying state of heightened awareness of social threats (Masi et al., 2011). For instance, loneliness has been associated with attention

to negative social information in a variety of cognitive tasks, such as the Attentional Social Threat Task (Bangee et al., 2014), Social Stroop Task (S. Cacioppo et al., 2015), and visual attention eye-tracking of videos of social scenes involving interpersonal rejection. Across these studies, lonely people exhibit greater attention to threatening social information relative to non-lonely people (Qualter et al., 2013). Viewed collectively, this research suggests that lonely people show increased automatic attentional biases for social threats, which may engender self-protection motivations. Perceived social threats typically elicit self-protection motivations (Alicke & Sedikides, 2009), and this motivation may heighten the detection of social threats. For example, participants exposed to fear-inducing stimuli, which elicit self-protection motivations, were more adept at identifying fake smiles (Young et al., 2015) and exhibited greater memory for potential threats, such as male out-group members (Becker et al., 2010). Furthermore, when self-protection motivations were induced experimentally using fear, participants exhibited an increased tendency to perceive male out-group members as displaying anger. They also demonstrated improved recall of the facial features of male out-group members (Ackerman et al., 2006; Maner et al., 2005). Collectively, this research suggests that self-protection motivations potentially increase the ability to detect threats and increase encoding resources, improving memory of potential threats.

Consistent with ETL, I hypothesize that lonely people will have increased self-protection motivations, which, in turn, could increase the likelihood of having episodic simulations of interpersonal rejection.

1.3 Self-Protection Motivation Guiding Episodic Simulations Social Interactions

In order to predict what will happen, people construct simulations of future events by combining details from multiple memories (Gaesser & Fowler, 2020). Episodic simulations vary in how vivid they are envisioned; the vividness of the simulation is driven by several factors, including the temporal distance of the event, with increasing distance decreasing vividness (Liberian & Trope, 1998), how often one thinks about the event (Fingerman & Perlmutter, 1995), and the perceived importance of the event (Ainslie & Haslam, 1992) both associated with increased vividness of simulations.

Building on the bias literature, I expect to find that the increased self-protection motivations that accompany loneliness will bias the content and vividness of episodic simulations of interpersonal interactions. Specifically, self-protection motivation should engender vivid simulations of interpersonal rejection. One potential explanation for this is that self-protection motivation can activate memories of previous social threats (Ackerman et al., 2006; Becker et al., 2010), which may serve as the basis for simulations of future events. In addition, people with self-protection motivations may simulate future episodes of rejection to help them prepare for social threats. These predictions are consistent with research on confirmation bias, which suggests that people tend to process and generate information in ways that confirm existing beliefs, i.e., other people will engage in socially threatening behaviors (Nickerson, 1998).

1.4 Episodic Simulations and Lonely Social Behaviors

Although episodic simulations may serve as a way for lonely people to

prepare for what they perceive as a potential social threat, they may counter-productively increase the likelihood of engaging in aversive social behavior. Evidence suggests episodic simulations can guide human behavior independently of semantic knowledge (Benoit et al., 2011; Duncan & Shohamy, 2016; Schacter et al., 2008; Wilson & Gilbert, 2003). Vivid simulations have an especially pronounced effect on behavior (Gaesser & Schacter, 2014; Suddendorf & Corballis, 2007). More closely relevant to the proposed research, episodic simulations can motivate a variety of commonplace harms, including using deception to sell a product, undermining a coworker to increase one's chances of getting a promotion, being disingenuous to avoid helping someone, and telling a vegetarian the food they made is vegetarian when it is not (Morris et al., 2022). To measure aggressive behavior following an experimentally assigned episodic simulation in which participants were instructed to envision being excluded by a coworker, Brinker et al, 2022 used the hot sauce paradigm in which participants are asked to assign a portion of hot sauce for the other person to consume, with increased amounts of hot sauce indicating increased aggression. They found that when people had an episodic simulation of being socially excluded at work, they engaged in more aggression than when they were instructed to simulate acceptance.

Lonely people are also more likely to avoid social interactions than non-lonely people (Heinrich & Gullone, 2006), and episodic simulations may partially explain this association. I hypothesize that episodic simulations of interpersonal rejection could act as a social threat; according to the risk regulation model (Murray et al., 2006, 2008), when one desires to self-protect against potential social threats, they are

more likely to pull away from social connections. Several studies support this prediction (e.g., Murray et al., 1998, 2003; Overall & Sibley, 2009). Pulling away from social connections creates problems for close relationships by increasing partner dissatisfaction, the risk of rejection, and the risk of further conflict (Murray et al., 2003).

Lastly, having increased episodic simulations of interpersonal rejection could decrease prosocial behaviors. Several studies have shown that episodic simulations of prosocial behaviors will increase one's desire to engage in them (Gaesser & Fowler, 2020; Gaesser & Schacter, 2014). However, simulating interpersonal rejection may have the opposite effect, motivating people to refrain from prosocial behaviors. This is consistent with previous research that shows when one perceives they are being socially excluded, it decreases the likelihood of engaging in prosocial behaviors (Twenge et al., 2007). Prosocial behaviors can be an essential aspect of building and maintaining relationships with others (Penner. et al., 2005); therefore, withdrawing from prosocial behavior could also contribute to lonely people not building and maintaining their social networks (Amato, 1990; Lanser & Eisenberger, 2022), perpetuating their loneliness.

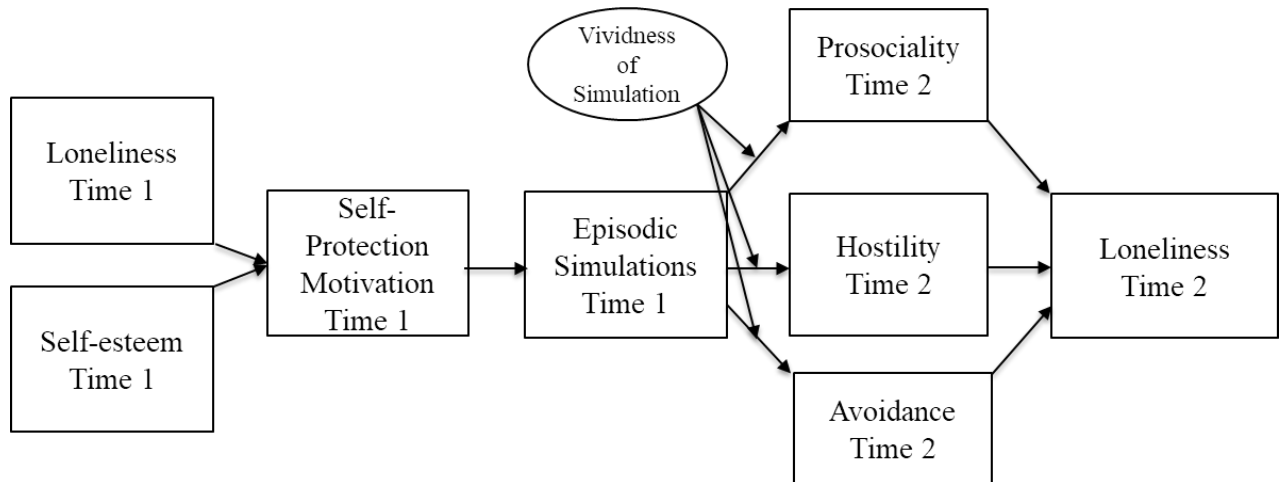
1.5 Current Research

The current study examined if lonely people are more likely to have episodic simulations of interpersonal rejections, as well as the mediating role episodic simulations play in the increased hostile and avoidant behaviors and decreased prosocial behaviors lonely people engage in. As shown in Figure 1, I expect that lonely people will have increased self-protection motivations due to increased

attention to social threats. In turn, the self-protection motivation predicted by increased loneliness is hypothesized to predict increased episodic simulations of interpersonal rejection. The relationships between episodic simulations of interpersonal rejection and social behaviors will be moderated by the vividness of simulations, with high vividness predicting stronger effects on behavior. Specifically, when simulations are vivid, episodic simulations of interpersonal rejection will be more positively related to hostile and avoidant behaviors and more negatively related to prosocial behaviors. These increased antisocial behaviors and reduced prosocial behaviors will then, in turn, predict future loneliness.

Figure 1

The mediating role of episodic simulations of interpersonal rejection on social behaviors.



Given the conceptual similarities between the sociometer theory of self-esteem, which posits that self-esteem functions as a monitor of one's social inclusions (Leary et al., 1995) and loneliness, which is the dissatisfaction with one social network, (Hawkley & Cacioppo, 2010) disentangling the effects of self-esteem on loneliness is essential for understanding the mechanisms that underly loneliness.

Evidence also suggests a bidirectional causal relationship between self-esteem and loneliness (Du et al., 2019). Self-esteem was added as a control variable to disentangle the effects of self-esteem on the processes associated with loneliness.

This research extends prior findings of the ETL by demonstrating that negativity bias associated with loneliness will also be observed in self-protection motivations. Self-protection motivations will be associated with episodic simulations of interpersonal rejection, which will be positively related to hostile and avoidant behaviors and decreased prosocial behaviors perpetuating loneliness. Prior research has demonstrated that lonely people remember and expect greater social exclusion (Teneva & Lemay, 2020). However, this research did not examine the effects of episodic simulations.

In the current study, participants completed four weekly assessments measuring variables relevant to the hypothesis. The intensive longitudinal design allowed for the assessment of within-person change over time in model variables. This approach can establish the temporal precedence of predictor variables relative to the criterion variables. Moreover, this method allowed for testing the hypotheses in a highly ecologically valid manner, as they pertain to naturally occurring social experiences.

Chapter 2: Methods

2.1 Participants

This study recruited 207 participants (75.88% women; 26.57% men; other .01%; M age = 19.04; SD = 1.28) fluent in English from the University of Maryland psychology student pool. With regard to racial and ethnic identities, the participants self-reported as 41.44% White, 29.51% Asian / Asian American, 13.04% Black / African American, 9.66% other identities/ mixed race, and 5.8% Hispanic/Latino, 6.7%. Participants completed the study in exchange for course credit. Four assessments nested within 207 participants exceed the rules of thumb for sample size requirements for multilevel modeling (Snijders & Bosker, 2011). Power analysis was not done due to the novel hypothesis being evaluated; there is no expected effect size to base power analysis. Participants participated in exchange for course credit.

2.2 Procedures

After providing informed consent to participate in the study, approximately seven days apart, participants completed four online sessions in which they completed all the measures described below during each session. There were 689 assessments available for analysis, with an average of 3.33 assessments per participant.

2.3 Measures

2.3.1 State Loneliness

Participants completed a modified version of the 3-item Version 3 UCLA loneliness scale (Hughes et al., 2004) to assess participants state loneliness (e.g., "In the past week, how often did you feel you lacked companionship?"; "In the past week, how often did you feel left out?"). Items were completed using 3-point scales

(1 = hardly ever; 3 = often). Higher scores indicate increased perceptions of loneliness. This scale was internally consistent at the within-subjects level ($\alpha = .73$)

2.3.2 State Self-protection Motivation

Participants completed a modified version of the 6-item social-protection subscale of the Fundamental Social Motives Inventory (Neel et al., 2016) to assess participants state self-protection motivations (e.g., "In the past week, I thought a lot about how to stay safe from dangerous people."; "In the past week, I was motivated to protect myself from dangerous others."). Items were completed using 7-point scales (1 = Strongly Disagree; 7 = Strongly Agree). Higher scores indicated increased self-protection motivation. This scale was internally consistent at the within-subjects level ($\alpha = .74$).

2.3.3 State Episodic Simulation of Interpersonal Acceptance

Participants state episodic simulations of interpersonal acceptance was measured using a modified version of prior research procedures (Lemay, 2023). Participants were first instructed, "Please take a moment to think about a scene that happened in the future involving at least one other person. Imagine a single event that took place at a specific time in the future that lasted for at least a few minutes." They then completed an 11-item scale measuring interpersonal acceptance during the simulation, with 6 items tapping into acceptance (e.g., "How accepting of you were the people in the event that you imagined?") and 5 items tapping into rejection (e.g., "How rejecting were the people of you in the event that you imagined?"). Items associated with rejection were reverse-scored. Items were completed using 5-point scales (1 = Not at all; 5 = Extremely). Higher scores indicated increased perceived

interpersonal acceptance. This scale was internally consistent at the within-subjects level ($\alpha = .91$).

2.3.4 Vividness of the Episodic Simulations

Participants completed 4 items assessing the vividness of the episodic simulations they brought to mind during the task described above ("How coherent and clear was the scene you imagined?"; "How strongly did you experience the scene while you were imagining it?") (Lemay, 2023). The items were responded to on a 5-point scale (1 = Not at all; 5 = Extremely). Higher scores indicated more vivid episodic simulations. This scale was internally consistent at the within-subjects level ($\alpha = .76$).

2.3.5 State Social Avoidance

Participants completed an 8-item modified version of the social behavior section of the Cognitive–Behavioral Avoidance Scale (CBAS) (Ottenbreit & Dobson, 2004) to assess participants social avoidance behaviors (e.g., "In the past week, I avoided attending social activities."; "In the past week, I kept to myself during social gatherings or activities."). Items were completed using a 5-point scale (1 = Not at all; 5 = Extremely). Higher scores indicated increased social avoidance behaviors. This scale was internally consistent at the within-subjects level ($\alpha = .84$).

2.3.6 State Hostile Behaviors

Participants completed a 5-item modified version of the hostility section of the Cognitive–Brief Symptom Inventory (Derogatis, 1975) to assess participants hostile behaviors (e.g., "In the past week, I felt easily annoyed or irritated"; "In the past week, I got into arguments"). Items were completed using a 5-point scale (1 = Not at

all; 5 = Nearly all the time). Higher scores indicated increased hostile behaviors. This scale was internally consistent at the within-subjects level ($\alpha = .75$).

2.3.7 State Prosociality

Participants completed a 6-item modified version of the Prosociality Scale (Luengo et al., 2021) to assess participants prosociality (e.g., “In the past week, I was emphatic with those who were in need”; “In the past week, I easily put myself in the shoes of those who were in discomfort”). Items were completed using a 5-point scale (1 = Never/almost never true; 5 = Almost always/always true). Higher scores indicated increased prosociality. This scale was internally consistent at the within-subjects level ($\alpha = .80$).

2.3.8 State Self-esteem

Participants completed a modified version of the Rosenberg Self-esteem Scale (Rosenberg, 1965) to assess their self-esteem (e.g., “In the past week, on the whole, I was satisfied with myself.”; “In the past week, I took a positive attitude toward myself.”). Items were completed using a 7-point scale (1 = Strongly disagree; 7 = Strongly agree). Higher scores indicate increased prosociality. This scale was not internally consistent at the within-subjects level ($\alpha = .60$). To address this internal consistency issue, an item was dropped to increase the within-subjects internal consistency ($\alpha = .66$). Also, all item-total correlations were greater than 0.3 across all four weeks.

Chapter 3: Results

3.1 Data Analysis Plan

Multilevel modeling was conducted in SPSS version 29 to test the path model depicted in Figure 1. Repeated assessments were modeled as nested within people. All predictor variables measured at the weekly level were centered on person means (Nezlek, 2001). Within-person variability was represented at the lower level (Level 1), and between-person variability was represented at the upper level (Level 2). The path model was analyzed as a 1-1-1 model, with the independent variables and mediators measured at level 1 (Zhang et al., 2009). All variables were measured at the level of individual assessments, and within-person effects were estimated for all variables. Intercepts were modeled as randomly varying, and slopes were modeled as fixed due to limited degrees of freedom.

3.2 Assessing Model Fit

Mplus version 8.10 was used to conduct Multilevel confirmatory factor analysis (MFCFA) to assess if the underlying factor structure for the within-subjects level was consistent with the between-subjects factor structure (i.e., configural invariance). MCFCA models were considered to have an acceptable fit if they met the following criteria: $RMSEA \leq 0.08$ (Awang, 2012), $SRMR \leq 0.08$ (Hu & Bentler, 1999), $CFI \geq 0.90$ (Hair et al., 2009), and $TLI \geq 0.90$ (Forza & Filippini 1998). SRMR was required at both levels, and two out of three of the remaining model fit indices were needed to indicate acceptable fit. Chi-squared values were not used in determining model fit due to the inflated type 1 error rate associated with large sample sizes (Herzog et al., 2007; Moshagen, 2012). For episodic simulation of

interpersonal acceptance and self-esteem, the standard errors of negatively worded items that loaded on the same factor were modeled as correlated (Brown, 2015). As shown in Table 1, all models exhibited acceptable fit.

Table 1

MCFA Model Fit Parameters for Level 1 and Level 2

Variable	χ^2 (df)	CFI	TLI	RMSEA	Level 1 SRMR	Level 2 SRMR
Loneliness	491.70*** (06)	1.0	1.0	<.001	0.001	0.002
Self-protection motivations	69.29*** (18)	.96	.93	.064	0.033	0.027
Simulation of acceptance	286.10*** (58)	.95	.90	.076	0.031	0.033
Vividness of simulations	40.48*** (10)	.97	.93	.067	0.039	0.062
Social avoidance	131.26*** (40)	.95	.93	.058	0.045	0.027
Hostility	78.22*** (10)	.90	.80	0.1	0.059	0.059
Prosociality	56.71*** (18)	.97	.95	.056	0.036	0.025
Self-esteem	10.24*** (03)	.99	.95	.059	0.006	0.016

Note. CFA = confirmatory factor analysis; χ^2 = unscaled chi-square statistic; df = model degrees of freedom; CFI = comparative fit index; RMSEA = root mean square of approximation; SRMR = standardized root mean square residual.

*** $p < .001$

3.3 Primary Analysis, Path Model Assessing the Stability of Loneliness

First, intraclass correlations (ICC) and within-person variability were calculated using multilevel modeling in SPSS version 29. As shown in Table 2, all variables within the model were shown to have significant within-person variability.

Table 2

Intraclass Correlations and Variance Estimates

Variable	ICC	σ^2
Loneliness	.61	0.15***
Self-protection motivations	.59	0.69***
Simulation of acceptance	.37	0.32***
Social avoidance	.66	0.27***
Hostility	.57	0.22***
Prosociality	.64	0.31***

Note. ICC = intraclass correlations; σ^2 = within-person variance.

*** $p < .001$

3.4 Loneliness Predicting Self-Protection Motivations

Self-protection motivations was regressed on loneliness and the control variable self-esteem. Loneliness did not significantly predict self-protection motivations, $b = .05$, $t = .52$, $p = .605$. Self-esteem also did not significantly predict self-protection motivations, $b = .02$, $t = .367$, $p = .714$.

3.5 Self-Protection Motivations Predicting Episodic Simulation of Acceptance

Next, simulations of interpersonal acceptance was regressed on self-protection motivations, loneliness, and self-esteem. Self-protection motivations did not significantly predict simulations of interpersonal acceptance, $b = .03$, $t = .83$, $p = .405$. Loneliness also did not predict simulations of interpersonal acceptance, $b = -0.01$, $t = -0.13$, $p = 0.898$. Self-esteem significantly predicted increased simulations of interpersonal acceptance, $b = 0.12$, $t = 3.56$, $p < .001$.

3.6 Episodic Simulation of Acceptance Predicting Social Behaviors

Next week's social avoidance, next week's prosociality, and next week's hostility were regressed separately on simulations of interpersonal acceptance, self-protection

motivations, loneliness, and self-esteem. The results of the regressions are presented in Table 3.

Table 3

Regression Coefficients of Next Week's Social Behaviors on Simulations of Acceptance

Variable	Next week's avoidance			Next week's prosociality			Next week's hostility		
	B	t	P	B	t	P	B	t	P
Loneliness	-.01	-.13	.885	.03	.35	.727	-.09	-1.27	.204
Self-esteem	.12	3.56	<.001	-.06	-1.45	.148	0.00	-.06	.951
Self-protection motivations	-.01	-.32	.747	.04	.97	.333	.01	.42	.673
Simulation of acceptance	-.02	-.37	.71	.03	.5	.619	.102	2.24	.027

Simulation of acceptance significantly positively predicted next week's hostility.

Simulations of acceptance did not significantly predict next week's social avoidance or next week's prosociality.

3.7 Vividness Moderating the Relationship Between Simulations of Acceptance and Social Behaviors

Additionally, to assess if the vividness of the simulation moderated the relationship between next week's social avoidance, next week's prosociality, and next week's hostility, all three variables were regressed separately on simulations of interpersonal acceptance, the vividness of the episodic simulations, a product term representing the interaction between simulations of interpersonal acceptance and the vividness of the simulations, self-protection motivations, loneliness, and self-esteem. The results of the interactions between simulations of acceptance and the vividness of the simulations are presented in Table 4.

Table 4

Vividness moderating simulations of acceptance and social behaviors

Variable	Next week's avoidance			Next week's prosociality			Next week's hostility		
	b	t	P	b	t	P	b	t	P
Vividness X Simulation ^a	-.01	-.12	.916	-.02	-.13	.895	.04	.45	.656

Note.

^aProduct term representing the interaction between the vividness of the simulation and simulations of interpersonal acceptance.

The interaction between simulation interpersonal acceptance and the vividness of the simulation did significantly predict next week's social avoidance, next week's prosociality, or next week's hostility.

3.8 Social Behaviors Predicting Next Week's Loneliness

Lastly, next week's loneliness was regressed on next week's social avoidance, next week's prosociality, next week's hostility, simulations of interpersonal acceptance, self-protection motivations, loneliness, and self-esteem. The results of the regressions are presented in Table 5. Next week's social avoidance, and next week's hostility positively predicted next week's loneliness. This week's loneliness also predicted next week's loneliness. Next week's prosociality, simulations of acceptance, self-protection motivations, and self-esteem did not predict next week's loneliness.

Table 5*Regression Coefficients of Next Week's Loneliness on Social Behaviors*

Variable	Next week's loneliness		
	b	t	P
Next week's social avoidance	.15	3.72	<.001
Next week's hostility	.26	6.01	<.001
Next week's prosociality	.01	.18	.859
Simulations of acceptance	-.06	-1.81	.072
Self-protection motivations	-.01	-.53	.594
This week's loneliness	-.25	-4.81	<.001
Self-esteem	-.03	-1.24	.216

3.9 Assessing Temporal Precedence

To assess the temporal precedence of the significant pathways in the model described above, level 1 cross-lagged analyses were conducted. First, the temporal precedence of the relationship between simulations of interpersonal acceptance and hostility was assessed. Next week's simulations of interpersonal acceptance were regressed on hostility, this week's simulations of interpersonal acceptance, loneliness, and self-esteem. Hostility significantly predicted next week's simulations of interpersonal acceptance, $b = -.17$, $t = -2.78$, $p = .006$. In addition, next week's hostility was regressed on simulations of interpersonal acceptance, hostility, loneliness, and self-esteem. Simulations of interpersonal acceptance significantly predict next week's hostility, $b = .10$, $t = 2.29$, $p = .022$. These results suggest that simulations of acceptance predicted greater subsequent hostility, and hostility predicted lower subsequent simulations of acceptance.

Next, the temporal precedence of the relationship between hostility and loneliness was assessed. Next week's loneliness was regressed on hostility, social

avoidance, prosociality, simulations of interpersonal acceptance, self-protection motivations, loneliness, and self-esteem. Hostility significantly predicted next week's loneliness $b = -.128$, $t = -2.72$, $p = .007$. Next week's hostility was regressed on loneliness, hostility, social avoidance, prosociality, simulations of interpersonal acceptance, self-protection motivations, and self-esteem. Loneliness did not predict next week's hostility, $b = -.06$, $t = -.90$, $p = .370$. This provides support that there is temporal precedence for this week's hostility being negatively associated with next week's loneliness.

Next, the temporal precedence of the relationship between social avoidance and loneliness was assessed. Next week's loneliness was regressed on social avoidance, social hostility, prosociality, simulations of interpersonal acceptance, self-protection motivations, loneliness, and self-esteem. Social avoidance did not significantly predict next week's loneliness $b = .08$, $t = 1.85$, $p = .065$. Next week's social avoidance was regressed on loneliness, hostility, social avoidance, prosociality, simulations of interpersonal acceptance, self-protection motivations, and self-esteem. Loneliness did not predict next week's social avoidance, $b = .08$, $t = .11$, $p = .911$.

3.10 Effect of Duration of Loneliness

In an exploratory analysis, I assessed if level 2 duration of loneliness moderates the relationship between any of the variables in the path model in Figure 1. The duration of loneliness was added midway through data collection; data is available for 100 participants. For the relationship between self-protection motivations and loneliness, there was an interaction between the duration of loneliness and loneliness predicting self-protection motivations, $b = -.247$, $t = -2.88$,

$p = .004$. Conditional effects of loneliness were examined at low (1 SD below the mean) and high (1 SD above the mean) levels of duration of loneliness. Loneliness did not significantly predict self-protection motivations for participants low on duration of loneliness, $b = 1.30$, $t = 1.63$, $p = .105$. Loneliness predicted greater self-protection motivations for participants who were high on the duration of loneliness, $b = 1.70$, $t = 2.73$, $p = .007$. The duration of loneliness did not moderate the effect of loneliness on episodic simulations of interpersonal acceptance, $b = 0.02$, $t = 0.34$, $p = 0.732$; loneliness on social avoidance, $b = -0.04$, $t = -0.6$, $p = 0.553$; prosociality, $b = 0.09$, $t = 1.07$, $p = 0.288$; hostility, $b = 0.12$, $t = 1.74$, $p = 0.084$; or next week's loneliness, $b = 0.01$, $t = 0.29$, $p = 0.771$.

3.11 Supplemental Analysis: Simulated Acceptance and Rejection

In a supplemental analysis, the model depicted above was analyzed, splitting the measure of simulated acceptance into simulated positivity (name was changed from acceptance for increased clarity) and simulated rejection. Simulated positivity was comprised of the 6 acceptance items described above, with higher scores indicating increased simulated positivity. Simulated rejection was comprised of the 5 rejection items described above, with higher scores indicating increased simulated rejection. Rejection was split into a separate measure because loneliness is theorized as an increased vigilance to social threats and rejection sensitivity (Cacioppo & Cacioppo, 2018a; J. T. Cacioppo et al., 2014). Therefore, loneliness may be more likely to affect and be affected by perceptions of episodic simulations of interpersonal rejection. Specifically, I expect episodic simulations of rejection will significantly predict the three social behaviors above and beyond simulations of positivity.

3.12 Supplemental Analysis: Self-Protection Motivations Predicting Episodic Simulation of Rejection and Positivity

Simulations of interpersonal rejection were regressed on self-protection motivations, loneliness, and self-esteem. Self-protection motivations did not significantly predict simulations of interpersonal rejection, $b = 0.01$, $t = 0.35$, $p = 0.726$. Loneliness also did not predict simulations of interpersonal acceptance, $b = .00$, $t = 0.07$, $p = 0.948$. Self-esteem significantly negatively predicted simulations of interpersonal rejection, $b = -0.1$, $t = -3.03$, $p = 0.003$. Simulations of interpersonal positivity were regressed on self-protection motivations, loneliness, and self-esteem. Self-protection motivations did not significantly predict simulations of interpersonal positivity, $b = 0.06$, $t = 1.4$, $p = 0.162$. Loneliness also did not predict simulations of interpersonal positivity, $b = -0.01$, $t = -0.14$, $p = 0.888$. Self-esteem significantly predicted increased simulations of interpersonal positivity, $b = 0.14$, $t = 3.11$, $p = 0.002$.

3.13 Supplemental Analysis: Episodic Simulation of Rejection and Acceptance Predicting Social Behaviors

Next week's social avoidance, next week's prosociality, and next week's hostility were regressed separately on simulations of interpersonal positivity, simulations of interpersonal rejection, self-protection motivations, loneliness, and self-esteem. The results of the regressions are presented in Table 6.

Table 6*Regression Coefficients of Next Week's Social Behaviors on Simulations of Acceptance*

Variable	Next week's avoidance			Next week's prosociality			Next week's hostility		
	B	t	P	B	t	P	B	t	P
Loneliness	.01	.19	.852	.02	.21	.838	-.09	-1.28	.201
Self-esteem	.07	1.73	.084	-.07	-1.56	.119	-.01	-.37	.711
Self-protection motivations	-.02	-.69	.492	.04	1.10	.272	.02	.71	.477
Simulation of positivity	.08	1.85	.066	-.06	-1.29	.198	-.04	-1.07	.285
Simulation of rejection	.16	2.92	.004	-.14	-2.19	.029	-.19	-3.68	<.001

Simulations of positivity did not significantly predict next week's social avoidance, next week's prosociality, or next week's hostility. In contrast, Simulations of interpersonal rejection significantly predicted increases in next week's social avoidance and increases in next week's prosociality. Contrary to predictions, simulations of rejection significantly negatively predicted next week's hostility.

3.14 Supplemental Analysis: Social Behaviors Predicting Next Week's Loneliness

Lastly, next week's loneliness was regressed on next week's social avoidance, next week's prosociality, next week's hostility, simulations of interpersonal positivity, simulations of interpersonal rejection, self-protection motivations, loneliness, and self-esteem. The results of the regressions are presented in Table 7. Next week's social avoidance, and next week's hostility, and episodic simulations of positivity predicted next week's loneliness. This week's loneliness also predicted next week's loneliness. Next week's prosociality, simulations of rejection, self-protection motivations, and self-esteem did not predict next week's loneliness.

Table 7*Regression Coefficients of Next Week's Loneliness on Social Behaviors*

Variable	Next week's loneliness		
	b	t	P
Next week's social avoidance	.16	3.87	<.001
Next week's hostility	.25	5.67	<.001
Next week's prosociality	.00	.08	.938
Simulations of acceptance	-.06	-2.07	.040
Simulations of rejection	-.02	-.42	.673
Self-protection motivations	-.01	-.37	.714
This week's loneliness	-.25	-4.87	<.001
Self-esteem	-.04	-1.30	.196

3.15 Assessing Temporal Precedence of the Supplemental Analysis

To assess the temporal precedence of the significant pathways in the supplemental analysis described above, level 1 cross-lagged analyses were conducted. First, the temporal precedence of the relationship between simulations of interpersonal rejection and hostility was assessed. Next week's simulations of interpersonal rejections were regressed on hostility, this week's simulations of interpersonal rejection, loneliness, and self-esteem. Hostility significantly predicted next week's simulations of interpersonal rejection, $b = .19$, $t = 2.96$, $p = .006$. In addition, next week's hostility was regressed on simulations of interpersonal rejection, hostility, loneliness, and self-esteem. Simulations of interpersonal rejection significantly predict next week's hostility, $b = -.19$, $t = -3.68$, $p < .001$. These results suggest that simulations of rejection predicted greater subsequent hostility, and hostility predicted lower subsequent simulations of rejection.

Next, the temporal precedence of the relationship between simulations of

interpersonal rejection and social avoidance was assessed. Next week's simulations of interpersonal rejection were regressed on social avoidance, this week's simulations of interpersonal rejection, loneliness, and self-esteem. Social avoidance did not predict next week's simulations of interpersonal rejection, $b = -0.06$, $t = -1.09$, $p = 0.278$. In addition, next week's social avoidance was regressed on simulations of interpersonal rejection, social avoidance, loneliness, and self-esteem. Simulations of interpersonal rejection significantly predict next week's social avoidance, $b = .16$, $t = 2.92$, $p = .004$.

Next, the temporal precedence of the relationship between simulations of interpersonal rejection and prosociality was assessed. Next week's simulations of interpersonal rejections were regressed on prosociality, this week's simulations of interpersonal rejection, loneliness, and self-esteem. Prosociality did not predict next week's simulations of interpersonal rejection, $b = 0.01$, $t = 0.19$, $p = 0.853$. In addition, next week's prosociality was regressed on simulations of interpersonal rejection, social avoidance, loneliness, and self-esteem. Simulations of interpersonal rejection significantly predict next week's prosociality, $b = -.14$, $t = -2.19$, $p = .029$.

Lastly, the temporal precedence of the relationship between simulations of interpersonal acceptance and loneliness was assessed. Next week's simulations of interpersonal acceptance were regressed on prosociality, this week's simulations of interpersonal acceptance, loneliness, and self-esteem. Loneliness did not predict next week's simulations of interpersonal rejection, $b = 0.04$, $t = 0.41$, $p = 0.682$. In addition, next week's loneliness was regressed on simulations of interpersonal acceptance, social avoidance, loneliness, and self-esteem. Simulations of

interpersonal acceptance significantly predict next week's loneliness, $b = -.06$, $t = -2.07$, $p = .040$.

3.16 Coding Interpersonal Simulations

The memo stated that there was a plan to have third parties rate the levels of acceptance displayed in the simulations based on participants' open-ended descriptions of their simulations. The purpose of this analysis was to address an alternative explanation for the effect of simulations: lonely people have biases in how they judge their simulations rather than, as expected, having more negative simulations. However, our results did not find loneliness was associated with simulations of acceptance. Moreover, an examination of the open-ended descriptions revealed that most participants did not provide sufficient detail to allow for this coding. Hence, the simulations were not coded.

Chapter 4: Discussion

4.1 Summary of Results

The current research tested novel hypotheses regarding the underlying mechanisms that may contribute to the stability of loneliness over time. College-aged participants completed weekly assessments of their loneliness and other relevant variables. The primary goal of the analysis was to assess the path model depicted in Figure 1. Additionally, a supplemental analysis of the model depicted in Figure 1 was conducted, splitting episodic simulations into two measures: positivity (acceptance) and rejection. Before conducting the primary analysis, MCFA was used to assess the within-subjects factor structure at level one. All variables exhibited acceptable fit within-subjects and significant variability at the within-subjects level.

For the model depicted in Figure 1, loneliness did not predict self-protection motivations. Self-protection motivations did not predict episodic simulations of acceptance. Contrary to the hypothesis, increased episodic simulations of acceptance significantly predict increases in next week's hostility. Episodic simulations of acceptance did not predict next week's social avoidance or next week's prosociality. The vividness of the simulations did not moderate the relationship between episodic simulations of acceptance and any of the social behaviors. Lastly, as predicted, next week's hostility was significantly positively associated with next week's loneliness. As predicted, next week's social avoidance was also significantly positively associated with next week's loneliness. Next week's prosociality did not predict next week's loneliness.

The temporal precedence for all significant relationships in the model was

assessed in an additional analysis. For the relationship between simulations of interpersonal acceptance and hostility, there was evidence that the relationship is bidirectional. Increased hostility significantly predicted increases in next week's simulations of interpersonal acceptance. Increases in simulations of interpersonal acceptance significantly predict increases in next week's hostility. For the relationship between hostility and loneliness, I found evidence that increased hostility significantly predicts increases in next week's loneliness. Loneliness did not predict next week's hostility. There is no evidence to support temporal precedence in either direction for social avoidance and loneliness.

In an exploratory analysis, I assessed if the duration of loneliness moderates the relationship between loneliness and any of the variables in the path model in Figure 1. In this analysis, the only significant interaction was the duration of loneliness moderating the relationship between loneliness and self-protection motivations. When the duration of loneliness was high, loneliness predicted increased self-protection motivations.

In the supplemental analysis, as predicted, increased episodic simulations of rejection predicted increased social avoidance and decreased prosociality. Contrary to predictions, simulations of rejection predicted decreased hostility the following week. As predicted, episodic simulations of positivity did not significantly predict any of the social behaviors in the following week.

4.2 Loneliness, Duration of Loneliness, Self-protection Motivations, and Episodic Simulations

It was hypothesized that loneliness would predict increased self-protection motivations, which would then predict decreased episodic simulations of acceptance;

neither prediction was supported in the primary or supplemental analysis. However, in the exploratory analysis, I found evidence that the duration of loneliness interacts with loneliness to predict self-protection motivations, with loneliness being associated with self-protection motivations for people who were high in duration of loneliness. The duration of loneliness did not moderate the effects of loneliness on any of the other paths examined in this research. In a rapid systematic review, the duration of loneliness was observed to be a stronger predictor of mental health outcomes than the severity of loneliness (Loades et al., 2020). Given that the present study found the duration of loneliness moderating the effect of loneliness on self-protection motivations and previous findings highlighting the importance of the duration of loneliness, it is plausible that the cognitive biases associated with perceiving others as dangerous are exacerbated for those who have experienced loneliness for a greater duration. Consistent with ETL, this could partially explain why loneliness is stable over time, as people who experience prolonged loneliness are more likely to perceive the social world as dangerous, reducing their ability to build and maintain social connections. In contrast, people who experience a brief stint of loneliness may be less likely to see others as social threats and may be able to seek connection with others to alleviate their loneliness.

As well, self-esteem was found to positively predict simulations of acceptance and negatively predict simulations of rejection. These findings are consistent with the sociometer theory of self-esteem, which posits that self-esteem functions as a monitor of one's social inclusion (Leary et al., 1995). When an individual has a sociometer fine-tuned to expect social rejection, they may project these expectations into their

episodic simulations.

4.3 Episodic Simulations Influencing Social Behaviors and Loneliness

The present study provided evidence that episodic simulations of rejection predict increased social avoidance in the following week. Social avoidance, in turn, did not significantly predict next week's episodic simulations of rejection. This highlights the importance of episodic simulations of rejection in understanding the mechanisms of social avoidance. Previous work has shown that lonely people are more sensitive to rejection and are more likely to engage in social avoidance (J. T. Cacioppo et al., 2000; Watson & Nesdale, 2012). It is plausible that the underlying mechanism is that lonely individuals are more likely to engage in simulations of rejection, which leads them to expect rejection.

As well, for prosocial behaviors, increased episodic simulation of rejection predicted decreased prosocial behaviors in the following week. Prosocial behaviors, in turn, did not predict simulations of rejection the following week. These findings extend the literature on episodic simulations of rejection on prosocial behaviors; it has been shown that experimentally manipulated simulations of rejection decrease intentions to engage in prosocial behaviors (Twenge et al., 2007). To the best of my knowledge, the present study provides novel evidence that naturally occurring episodic simulations of rejection are associated with decreased prosocial behaviors in one's natural environment. Consistent with existing research on the effects of social rejection on prosocial behaviors, episodic simulations of rejection may impair emotional processing, which in turn decreases empathy. This reduction in empathy subsequently lowers the willingness to engage in prosocial behaviors (Twenge et al.,

2007).

Lastly, this study showed a bidirectional relationship between hostility and simulations of interpersonal acceptance (and rejection). The direction of the relationships is contingent on which variable is treated as the predictor variable. Simulations of interpersonal acceptance positively predict increased hostility next week (simulations of rejection negatively predict hostility). This finding is contrary to what was predicted; it was expected that simulations of acceptance would predict decreased hostility in the following week. It is plausible that people who are going to be engaging in socially dangerous interactions simulate acceptance to attempt to mitigate the stress associated with potential future rejection. However, the social rejection they inevitably experience leads to increased hostility. Also, contrary to the original hypothesis, hostility predicted decreased levels of acceptance in simulations the following week. It is plausible that when people engage in hostile behaviors, they expect people to be more rejective of them in the future. This is consistent with research by Schulz and Robins (2023) who theorized that episodic memories influence the formation of episodic simulations. They posit that when someone constructs an episodic simulation, they base it on what they perceive has happened in the past. If hostility elicited rejection in the past, those who are hostile may expect to be rejected in the future. Given that the results of this study were not predicted, further studies are needed to explore the temporal precedence of episodic simulations and hostility. The results of the present study suggest that the temporal relationship is complex and bidirectional.

4.4 Temporal Precedence of Loneliness and Hostility

As predicted, the results of this study found evidence to support that increased hostility was associated with increased loneliness the following week. However, loneliness did not predict greater hostility the following week. Thus, these findings are inconsistent with the ETL, which states loneliness and hostility are bidirectional. The ETL posits that loneliness causes cognitive biases that increase hostility, which in turn increases loneliness, which then increases cognitive biases (Cacioppo & Cacioppo, 2018a). This cyclical pattern is thought to be responsible for the enduring nature of loneliness. Previous studies have found evidence to support that loneliness and hostility are bidirectional (Segel-Karpas & Ayalon, 2020). However, this study was conducted in older adults, and they did not control for chronic pain. Within older adults, using experimental and longitudinal designs, chronic pain has been shown to be predictive of future hostility and future loneliness (Bannon et al., 2021; Boggero et al., 2019) and is thus a potential confounding variable that needs to be controlled for. Consistent with the present study's findings, Segel-Karpas & Ermer (2021) found that cynical hostility predicts future loneliness. Given the results of the present study and the current literature, preliminary evidence supports that the mechanism for the stability of loneliness is potentially more parsimonious than the ETL posits. The results of the present study suggest hostility may often give rise to later loneliness but not vice versa. Ergo, the observed stability of loneliness may not be driven by a feedback loop in which loneliness influences hostility, and in turn, hostility influences loneliness. Alternatively, the enduring nature of loneliness may be a consequence of the stability of hostility, as studies have demonstrated that hostility is stable over time (Brummett et al., 2000; Hakulinen et al., 2014; Podubinski et al., 2016). In other

words, hostile behaviors may serve as a consistent catalyst for loneliness, while loneliness may not exert an influence on hostility.

4.5 Strengths

The primary strength of this study is the intensive longitudinal design. Using an intensive longitudinal design allowed for the assessment of within-person change over time in the modeled variables while establishing the temporal precedence of predictor variables relative to criterion variables. Moreover, this method allowed for testing the hypotheses in a highly ecologically valid manner, as they pertain to naturally occurring social experiences.

4.6 Limitations

For the first limitation, all participants in this study were college students and predominately women. The results from this study may not generalize to children or older adults, as the relationship between social behaviors and loneliness may differ among those age groups. Nevertheless, it is imperative to acknowledge that the prevalence of loneliness among college students has been a longstanding concern spanning several decades (Zahedi et al., 2022). Another limitation is that the conclusions of the study are based exclusively on self-report data. Evidence suggests that lonely people are less likely to identify their hostility and can have other social biases (Hawley & Cacioppo, 2010; Jones et al., 1982). Informant or observational data could provide additional insights into the social behaviors of lonely people beyond what they can observe in themselves. Lastly, the correlational nature of the study design limits the claims that can be made. While repeated measures designs allow for temporal precedence to be assessed, claims regarding cause and effect

cannot be made.

4.7 Future Directions

Future studies are planned to address the limitations of the current study. First, a study manipulating episodic simulations of acceptance/rejection is planned to assess the causal relationship between episodic simulations of acceptance and hostility and social avoidance. Additionally, hostility will be manipulated to assess the effects of hostility on both loneliness and simulations of acceptance. The duration of loneliness will be included as a measure in all future studies to assess the effects of the duration of loneliness on perceptions of the social world and social behaviors.

Appendix

State Loneliness

Instructions: "Indicate how often each of the statements below is descriptive of you."

1	2	3
Hardly ever	Some of the time	Often

1. In the past week, how often did you feel that you lack companionship?
2. In the past week, how often did you feel left out?
3. In the past week, how often did you feel isolated from others?

State Self-esteem

Instructions: Indicate the extent to which you agree or disagree with each statement using the accompanying response scale.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

1. In the past week, at times I thought I am no good at all.
2. In the past week, all in all, I was inclined to think that I am a failure
3. In the past week, on the whole, I was satisfied with myself.
4. In the past week, I took a positive attitude toward myself.

State Episodic Simulations of Interpersonal Acceptance

Prompt: "Please take a moment to imagine a scene that might happen in the future involving at least one other person. Imagine a single event taking place at a specific time in the future that lasts for at least a few minutes. Once you have thought about this event, please go to the next page.

Instructions: "Please rate the future scene that you imagined on each of the following dimensions using the accompanying response scale.

1	2	3	4	5
Not at all	Slightly	Somewhat	Very	Extremely

1. How accepting of you were the people in the event that you imagined?
2. How trustworthy were the people in the event that you imagined?
3. How warm were the people toward you in the event that you imagined?
4. How much did people in the event that you imagined care about your welfare?
5. How moral were the people in the event that you imagined?
6. How caring were the people toward you in the event that you imagined?
7. How cold were the people toward you in the event that you imagined?
8. How rejecting were the people of you in the event that you imagined?
9. How immoral were the people in the event that you imagined?
10. How untrustworthy were the people in the event that you remembered?
11. How critical were the people of you in the event that you imagined?

Vividness of Episodic Simulations

Prompt: "Please take a moment to imagine a scene that might happen in the future involving at least one other person. Imagine a single event taking place at a specific time in the future that lasts for at least a few minutes. Once you have thought about this event, please go to the next page.

Instructions: "Please rate the future scene that you imagined on each of the following dimensions using the accompanying response scale.

1	2	3	4	5
Not at all	Slightly	Somewhat	Very	Extremely

1. How coherent and clear was the scene you imagined?
2. How detailed was the scene that you imagined?
3. How clear was the location where this scene took place?
4. How strongly did you experience the scene while you were imagining it?

State Prosociality

Instructions: "The following statements describe a large number of common situations. There are no right or wrong answers; the best answer is the immediate, spontaneous one. Read each phrase carefully and select the number that reflects your first reaction."

1	2	3	4	5
Never/almost never true	Occasionally true	Sometimes true	Often true	Almost always/always true

1. In the past week, I was emphatic with those who were in need
2. In the past week, I intensely felt what others felt
3. In the past week, I tried to console those who were sad
4. In the past week, I easily put myself in the shoes of those who were in discomfort
5. In the past week, I tried to be close to and take care of those who were in need
6. In the past week, I spent time with those friends who were lonely

State Social Avoidance

Instructions: In the past week, how often did you do each of the following?

1	2	3	4	5
Not at all	Slightly	Somewhat	Very	Extremely

1. In the past week, I avoided attending social activities.
2. In the past week, I did not answer people who contacted me with social invitations.
3. In the past week, I did not go out to events when I know there will be a lot of people I do not know.
4. In the past week, I tried to be alone.
5. In the past week, I left social gatherings early.
6. In the past week, I made up excuses to get out of social activities.
7. In the past week, I turned down opportunities to socialize.
8. In the past week, I kept to myself during social gatherings or activities.

State Hostility

Instructions: In the past week, how often did you do or feel each of the following?

1	2	3	4	5
Not at all	Rarely	Sometimes	Often	Nearly all the time

1. In the past week, I felt easily annoyed or irritated
2. In the past week, I had temper outbursts that I could not control
3. In the past week, I had urges to beat, injure, or harm someone

4. In the past week, I had urges to break or smash things
5. In the past week, I got into arguments

State Self-Protection Motivation

Instructions: Indicate the extent to which you agree or disagree with each statement using the accompanying response scale.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

1. In the past week, I thought a lot about how to stay safe from dangerous people.
2. In the past week, I was motivated to keep myself safe from others.
3. In the past week, I did not worry about keeping myself safe from others.
4. In the past week, I worried about dangerous people.
5. In the past week, I thought about how to protect myself from dangerous people.
6. In the past week, I was motivated to protect myself from dangerous others.

Duration of Loneliness

Instructions: How often do you feel lonely?

- Have not yet experienced loneliness
- Have felt lonely in the past but not during the past few months
- Have felt loneliness during the last four months
- Have felt loneliness for about one year
- Have felt loneliness for more than several years
- Have always felt lonely

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