The *Journal of Marketing Research* and American Marketing Association (AMA) are issuing a retraction related to Jayati Sinha and Jing Wang (2013), “How Time Horizon Perceptions and Relationship Deficits Affect Impulsive Consumption,” *Journal of Marketing Research*, 50 (5), 590–605 at the recommendation of Editor in Chief Sachin Gupta.

A third party contacted the journal to identify concerns that Table 1 in the article seemed to display improbable results. Following AMA’s standard procedures, the Editor forwarded the concerns to the AMA Vice President of Publications, who arranged for a review by a panel of independent scholars. The AMA Vice President of Publications also contacted the authors, who were cooperative in assisting with the process. The first author did provide an alternate version of the table that she stated she found within her files, but both authors informed the journal that they had not retained the original data associated with the research.

In order to review the concerns raised to the journal with only the published table and corrected table, but no data, the independent panel examined the rightmost digits in the reported data of the published table—a standard method of detecting data fraud (Mosimann, Wiseman, and Edelman 1995). The panel found that the published table, as the complaints had suggested, is inconsistent with the data process that generated the data. The panel expressed concerns with the alternate table, but without the original data, there was no way to confirm the veracity. The panel determined the published table is unquestionably highly anomalous and the alternate table cannot be confidently used as a correction. Based on these concerns, the panel recommended that the article overall was not reliable, and the Editor in Chief concurred.

**Reference**

Mosimann, James E., Claire V. Wiseman, and Ruth E. Edelman (1995), “Data Fabrication: Can People Generate Random Digits?” *Accountability in Research*, 4 (1), 31–55.
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The authors examine how different types of relationship deficits (emotional vs. social) and time horizon perceptions (expanded vs. limited) affect consumers' impulsive behaviors. Emotional deficits refer to a lack of intimate attachment, whereas social deficits refer to a lack of social connections. Some people view time as expanded, whereas others view it as limited. Essential relationship deficits are defined as a lack of social connections for people with an expanded time horizon and a lack of emotional attachments for people with a limited time horizon. Inessential relationship deficits, conversely, are a lack of emotional attachments for people with an expanded time horizon and a lack of social connections for people with a limited time horizon. The authors reveal that people who experience essential relationship deficits are more likely to engage in impulsive behaviors than those who experience inessential relationship deficits, because the experience of essential relationship deficits depletes them. The authors report the convergent results of impulsive behaviors, both in terms of engagement in unplanned behaviors and in terms of preference toward short-term gratification across self-reported intentions, as well as actual behaviors.

Keywords: loneliness, impulsive behavior, time horizon perceptions, self-regulation failure, relationship deficits

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RETRACTED: How Time Horizon Perceptions and Relationship Deficits Affect Impulsive Consumption

Despite the popularity of social media, Americans lack quality relationships. In a 1985 survey, 10% of respondents had no one to discuss important matters with; in a 2004 survey, 24.6% of Americans responded that they had no one to confide in (McPherson, Smith-Lovin, and Brashears 2006). In the past two decades, increased use of screen-based communication has created social isolation and exacerbated low attachment to parents as well as to peers (Gross 2004; Richards et al. 2010). Despite the prevalence of these relationship deficits, researchers have paid little attention to how these deficits affect consumers. Our goal in this article is to examine how relationship deficits affect consumers' impulsive behaviors.

Instead of assuming that all relationship deficits affect impulsivity similarly, we delve further into the nature of relationship deficits (the lack of intimate vs. social relationships). Does the lack of significant others lead to impulsivity in a similar way as the lack of friends and colleagues? In the current research, we show that the way consumers respond to different types of relationship deficits is moderated by how they perceive time. Various daily events affect how consumers perceive time; for example, whereas media articles on cancer and natural disasters make people think that life is too short, news reports on scientific and technolo-
logical improvements empower consumers to believe that life is extended. How do time perceptions affect consumers' responses to the different types of relationship deficits? We strive to answer these questions in our research.

Impulsive purchasing is a widely recognized phenomenon. A recent study indicates that 80% of people made impulsive purchases in 2009, despite the recession (National Endowment for Financial Education 2010). There are two streams of previous research on impulsive purchases. One set of studies has examined the consequences of impulsive behaviors, such as generating different affects (happiness tempered with guilt vs. pride; Mukhopadhyay and Johar 2007) and rewarding subsequent behavior (indulgence over nonindulgence: Mukhopadhyay and Johar 2009). The other stream of research has focused on the antecedents of impulsive behaviors, such as mood (Rook and Gardner 1993), self-construal (Zhang and Shrum 2009), and chronic goals (Ramanathan and Menon 2006). Our research contributes to the literature of impulsive behaviors by studying how another important but understudied antecedent—consumers’ felt loneliness—affects their impulsive behaviors.

Although previous research has shown that social isolation gives rise to impulsive eating (Baumeister et al. 2005) and purchases (Vohs and Faber 2007), the majority of the research stream has examined social isolation as a result of general interpersonal relationship deficits, regardless of the nature of the deficits. However, relationship deficits can have two manifestations: (1) a lack of intimate attachment, which leads to emotional loneliness, and (2) a lack of engaging social networks, which leads to social loneliness (Weiss 1973). Although the two types of relationship deficits are not entirely orthogonal, they have distinct antecedents and consequences and are therefore two separate constructs (Baarsen et al. 2001; Chipuer 2001; Weiss 1973). Unlike previous research suggesting that loneliness should lead to increased impulsivity, regardless of whether it results from a lack of intimate attachment or a general social network, we postulate that only deficits of the most essential relationships will lead to impulsive behaviors.

Which type of relationship is considered more essential? We propose that this is determined by consumers’ time horizon perceptions. Socioemotional selectivity theory (SST) suggests that people organize their goals in terms of relative priorities over their lifetime. Specifically, people who perceive time as expanded prioritize future-oriented goals over emotionally meaningful ones and are motivated to focus on social relationships; whereas people who perceive time as limited prioritize emotionally meaningful goals over future-oriented ones and are more motivated to concentrate on emotional attachment (Carstensen 1995). The SST acknowledges that people need both social and emotional relationships, but it is the relative salience of one versus the other that changes with time horizon perceptions (Carstensen 1995).

In our research, we examine how time horizon perceptions moderate the effect of the different types of relationship deficits on impulsive consumption. Socioemotional selectivity theory suggests that emotional relationships are more essential to people with a limited time horizon and social relationships are more essential to people with an expanded time horizon (Carstensen 1995). Thus, we define the experience of essential relationship deficits (hereinafter referred to as “essential deficits”) as situations in which people with an expanded time horizon lack social connections and people with a limited time horizon lack emotional attachments. We define the experience of inessential relationship deficits (“inessential deficits” hereinafter) as situations in which people with an expanded time horizon lack emotional attachments and people with a limited time horizon lack social connections (Appendix A). We theorize and demonstrate that people who experience essential deficits are more likely to engage in impulsive behaviors than those who experience inessential deficits. We further show that essential deficits result in greater impulsivity because people experiencing such relationship deficits have reduced self-regulatory resources.

Note that we do not argue that an expanded (limited) time horizon will lead to social (emotional) relationship deficits. Our theory does not address the antecedents of social versus emotional loneliness. Instead, we examine how the time horizon moderates the impact of social versus emotional loneliness on impulsivity. People with different time horizon perceptions value different types of relationships. For a person who lacks a particular type of relationship (e.g., friends rather than family), the time horizon perception that prioritizes this type of relationship (e.g., an expanded horizon) will highlight the deficit of the relationship and thus will lead to greater depletion and impulsivity. Therefore, it is not a particular time horizon that depletes people; rather, the lack of the most important relationships, highlighted by time horizon perceptions, depletes people and, in turn, increases impulsivity. In the following sections, we develop our conceptual model and present five studies to test our hypotheses.

THEORETICAL DEVELOPMENT

Previous Research on Impulsivity

The formation and maintenance of positive social relationships is one of the most basic human needs (Maslow 1968). Failure to satisfy these needs can have important consequences for social functioning (Baumeister and Leary 1995). Indeed, multiple studies have shown that temporary social isolation reduces self-regulatory resources in many spheres, such as reckless driving (Harano, Peck, and McBride 1975), heavy smoking (Ernst and Cacioppo 1999), and impulsive and unhealthy eating (Baumeister et al. 2005).

The literature on impulsive behaviors has explored two typical definitions of impulsivity. One refers to the trade-off between long-term benefits and short-term gratification. For example, socially isolated people are more prone to eat unhealthy (vs. healthy) snacks, knowing that sacrificing taste for health benefits will make them healthier in the long run (Baumeister et al. 2005). The other definition of impulsivity denotes unplanned behaviors. For example, participants in Vohs and Faber’s (2007) studies spent more money in unanticipated buying situations when their self-regulatory resources were depleted.

Our theory incorporating different types of relationship deficits and time horizon perceptions should apply to both manifestations of impulsivity. In our theory, the specific relationship deficit that is most important to a particular time horizon perspective increases impulsivity, regardless of how
the impulsivity manifests itself. Across our studies, we examine impulsivity in terms of both a preference toward short-term gratification (Studies 1b, 3, and 4) and unplanned behaviors (Studies 1a and 2), and we present convergent results across the two manifestations of impulsivity.

**Relationship Deficits and Time Horizon Perceptions: Essential Versus Inessential Deficits**

Perceived relationship deficits (i.e., when relationship expectations are not met) lead to feelings of loneliness (e.g., Ernst and Cacioppo 1999). Whereas a unidimensional conceptualization of loneliness refers to a unitary state that remains constant across various causes and circumstances of relationship deficits (e.g., Russell 1996), a multidimensional conceptualization of loneliness distinguishes social and emotional loneliness as being related to different types of relationship deficits (DiTommaso and Spinner 1997; Weiss 1973). Social loneliness is caused by the lack of a circle of friends and acquaintances who can provide a sense of belonging and companionship. Emotional loneliness, in contrast, is caused by the lack of an intimate attachment (e.g., spouses, parents) and is accompanied by feelings of desolation and insecurity.

Previous research suggests that there are advantages of treating loneliness as a multidimensional (vs. unidimensional) construct. The two forms of loneliness (social vs. emotional) are so distinct from each other that the presence of one cannot compensate for the loss of the other. For example, the loss of an intimate partner can only be substituted by another close and intimate bond rather than by other supportive friendships from a larger social group (Baarsen et al. 2001; Weiss 1973). In addition, we can provide greater insights into lonely people's behaviors with the distinction between emotional and social loneliness. For example, research incorporating a multidimensional (vs. unidimensional) perspective of loneliness has shown that youths' general psychological health is largely influenced by the experience of social, but not emotional, isolation (Chipuer 2001); that loneliness in elderly rural adults is only strongly related to emotional, but not social, loneliness (Dugan and Kivett 1994); and that emotional (not social) loneliness is associated with increased suicidal ideation in bereavement and severe depressive symptoms (Stroebe, Stroebe, and Abakoumkin 2003). Overall, the current literature suggests that recognizing the distinction between social and emotional loneliness is important in understanding consumer choices and behaviors.

Yet which type of loneliness leads to impulsive consumption? According to SST, goals are set in temporal contexts, and the importance of a particular goal is discussed relative to the importance of other goals (Carstensen 1992). When people view time as limited, they attach greater importance to goals from which they derive emotional attachment and less importance to goals that expand their social connections (Lang and Carstensen 2002). In contrast, when people view time as expanded, they attach greater importance to goals that expand their social connections and less importance to goals from which they derive emotional attachment (Fredrickson and Carstensen 1990, Study 2; Fung and Carstensen 2004, no-manipulation condition; Fung and Carstensen 2006; Fung, Lai, and Ng 2001; Lang and Carstensen 2002). This notion suggests that social connections are more important to people with an expanded time horizon than to those with a limited one. Therefore, for someone who lacks social connections, an expanded horizon exacerbates feelings of social loneliness more than a limited horizon does (Appendix A).

Conversely, emotional attachment is more important to people with a limited time horizon than to those with an expanded time horizon (Fung and Carstensen 2004, no-manipulation condition; Fung, Carstensen, and Lutz 1999; Fung, Lai, and Ng 2001). Thus, for someone who lacks emotional attachment, a limited horizon aggravates feelings of emotional loneliness more than an expanded horizon does. In essence, we hypothesize that relationship deficits along the dimension that is most important to people (i.e., essential deficits) should have a stronger impact on their decisions and behaviors than relationship deficits along the less important dimension (i.e., inessential deficits). Drawing on previous findings that social isolation leads to impulsive behaviors (Baumeister et al. 2005), we further hypothesize the following:

**H1:** People with essential deficits are more likely to engage in impulsive behaviors than people with inessential deficits.

Note that the unidimensional construct of loneliness would lead to different predictions. Previous research with the unidimensional construct of loneliness suggests that people should engage in impulsive behaviors when they feel socially isolated (Baumeister et al. 2005; Vohs and Faber 2007), and that this should be the same for all people who feel social isolation. Our theory suggests that this is not true. The lack of social connections should lead to impulsive behaviors only for people with an expanded time horizon but not for those with a limited time horizon, and a lack of emotional attachment should lead to impulsive behaviors only for people with a limited time horizon but not for those with an expanded time horizon. Given the nuanced nature of the relationship between social/emotional loneliness and impulsivity, we argue that even though social and emotional loneliness are not entirely orthogonal (they may even be part of a continuum), as long as they retain the psychological features that distinguish them, we should expect to observe differences in their influence on impulsivity.

This leads to our next question: Why do essential deficits lead to more impulsive behaviors? We have theorized that people with essential deficits experience a lack of relationships that matter most to them. Therefore, the motivation to take care of these relationship deficits gains precedence (Maslow 1968). These acts consume a common resource that is limited and easily depleted, leaving people in a state of resource depletion and rendering them less able to exert further acts of self-regulation. For example, resisting the temptation to eat chocolates and cookies (and instead eating healthful but less appetizing radishes) caused participants to give up more quickly on a subsequent unsolvable puzzle task than people who had not exerted self-regulation (Baumeister et al. 1998). Self-regulation denotes the ability to resist temptations, "specifically those relevant to impulsive purchases and other expenditures that are likely to be regretted later on" (Baumeister 2002, p. 675). In a true impulsive purchasing situation, depleted (vs. nondepleted) participants showed an increase in impulsive spending (Vohs and Faber 2007). Our contention is that the lack of the most important relationships (i.e., essential deficits) reduces people's ability to regulate themselves and thus impairs self-regulation performance in subsequent impulsive behav-
iors. Specifically, we suggest that people with essential deficits do not have the resources to regulate themselves when they have essential relationship deficits to take care of first. As a result, we hypothesize the following:

H2: People with essential deficits are more impulsive than those with inessential deficits because the former have reduced self-regulatory resources.

In the following sections, we report five studies to test our hypotheses. We first demonstrate that essential deficits lead to more impulsive behaviors than do inessential deficits (H2) by using time horizon manipulation (Study 1a) and incorporating younger and older consumers (Study 1b). The next three studies test the underlying mechanism (H3). Specifically, we show that essential deficits lead to more depletion and more impulsive behaviors (Study 2) and that inessential deficits can also lead to impulsive behaviors when participants’ self-regulatory resources are depleted by other tasks (Study 3). Finally, we show that self-affirmation (which reduces depletion effects; Schmeichel and Vohs 2009) on essential deficits leads to reduced impulsivity (Study 4). Across the studies, we counterbalanced the order in which we measured loneliness and impulsivity: we measured loneliness either before (Studies 1b, 3, and 4) or after (Studies 1a and 2) impulsivity. We also controlled for other factors such as participants’ mood, need for uniqueness, need to belong, and depression tendency to rule out alternate explanations of our results.

**STUDY 1A**

We designed Study 1a to examine the effect of relationship deficits and time horizon perceptions on impulsive behaviors. The design of this study was a 2 (relationship deficits: social vs. emotional) × 3 (time horizon: expanded vs. limited vs. control) between-subjects design in which we measured participants’ social versus emotional relationship deficits using the Short Form of the Social and Emotional Loneliness Scale for Adults (SELSA-S; DiTommaso and Spinner 1997; Appendix B). We varied time horizon perceptions with an established manipulation (Williams and Drolet 2005) that has successfully affected time horizon perceptions in previous research. We assessed the dependent variable (impulsive purchasing intentions) using purchasing scenarios across different product categories. We expected an interaction of relationship deficits and time horizon perceptions such that people with essential deficits should engage in more impulsive behaviors than those with inessential deficits.

**Method**

One hundred fifty-three undergraduate students (46% male; M_age = 21.9 years) participated in this study for course credit. Participants were told that they would be taking part in three unrelated studies. In the first study, we manipulated time horizon perception (Williams and Drolet 2005). Each participant was randomly assigned to one of the three time horizon conditions: expanded, limited, or control. In the expanded time horizon condition, the instruction began with the following statement: “Life is long. Enjoy it forever, over a long period of time!” In the limited time horizon condition, participants saw the statement “Life is short. Enjoy the moment, right now!” Participants in these two conditions were then asked to list five ways they would like to enjoy their lives. In the control condition, participants were also asked to list five ways they would like to enjoy their lives, but they did not see a sentence stating whether life is long or short.

Then, in an ostensibly different task, we measured impulsive purchasing with two purchasing scenarios adopted from Rook and Fisher (1995). Participants read the purchasing scenarios in which the protagonist (one male character and one female character) had planned to buy a product but was facing the temptation of an impulsive purchase of a different (unplanned) product. Participants were asked to provide their opinion about whether the protagonist should buy the unplanned product on a seven-point scale (1 = “least impulsive,” and 7 = “most impulsive”; Appendix C). In the last study, participants completed several scales: a 15-item, seven-point (1 = “strongly disagree,” and 7 = “strongly agree”) SELSA-S (DiTommaso and Spinner 1997); a 20-item, four-point (1 = “never,” and 4 = “always”) revised University of California, Los Angeles (UCLA) loneliness scale (Russell 1996); a 20-item, five-point (1 = “very slightly or not at all,” and 5 = “extremely”) Positive Affect Negative Affect Schedule scales (Watson, Clark, and Tellegen 1988); a 10-item, five-point (1 = “strongly disagree,” and 5 = “strongly agree”) Need to Belong scale (Leary et al. 2007); a 11-item, five-point (1 = “strongly disagree,” and 5 = “strongly agree”) consumer’s Need for Uniqueness scale (Tian, Bearden, and Hunter 2001); and a 21-item, four-point (0 = “minimal,” and 3 = “severe”) Beck Depression Inventory (Beck 1978). Participants then completed two three-item, seven-point scales (1 = “strongly disagree,” and 7 = “strongly agree”) for the time horizon manipulation check (Williams and Drolet 2005; Appendix D). Finally, they answered demographic questions and were also asked to state their understanding of the purpose of the study. No participant guessed the study hypothesis correctly. For the questionnaires and results for this and for the following studies, see the Web Appendix.

**Results**

**Loneliness scales.** We assessed global loneliness with the revised UCLA loneliness scale (α = .84). We assessed social (α = .89) and emotional (α = .84) loneliness with SELSA-S (for summary statistics of the loneliness scales, see Tables 1 and 2). We used a principal component factor analysis on the SELSA-S questions. A Varimax rotation resulted in a two-factor solution that reflects social loneliness and emotional loneliness, consistent with the structure of the scale. To examine the relationship between social loneliness, emotional loneliness, and global loneliness, we calculated the three scores for each participant, following DiTommaso and Spinner (1997) and Russell (1996). A correlation analysis of the three revealed that social loneliness had a higher correlation (r = .48) with global loneliness, whereas emotional loneliness had a smaller correlation (r = .33) with the global loneliness scores. Social loneliness was also related to emotional loneliness (r = .55). We conducted similar analyses for all of our subsequent studies and obtained similar results (Study 1b: r = .4, r = .3, and r = .36; Study 2: r = .4, r = .4, and r = .45; Study 3: r = .39, r = .3, and r = .4; Study 4: r = .49, r = .3, and r = .45).

To measure participants’ dominant relationship deficits (social vs. emotional), we first standardized the social and emotional loneliness scores. Specifically, we subtracted the mean of the social (emotional) loneliness scores from each social (emotional) loneliness score and then divided the dif-
ference by the standard deviation of the social (emotional) loneliness scores. Then, we created the relationship deficit index by subtracting the standardized emotional loneliness scores from the standardized social loneliness scores. A higher score on the relationship deficit index suggests the dominance of social relationship deficits, whereas a lower score suggests the dominance of emotional relationship deficits.

**Manipulation check.** Drawing from Williams and Drolet (2005), we generated a time horizon index ($\alpha = .86$) by subtracting the sum of the last three items associated with an expanded time horizon from the sum of the first three items associated with a limited time horizon. Positive (negative) values on the index suggest a limited (expanded) view. A one-way analysis of variance (ANOVA) on the index revealed a significant main effect of time horizon ($F(2, 150) = 326.89, p < .001$) such that participants in the expanded time horizon condition viewed time as more expanded ($M_{\text{expanded}} = -2.77$) and participants in the limited time perspective condition viewed time as more limited ($M_{\text{limited}} = 2.6; t = -2.51, p < .001$). These results suggest that the manipulation of the time horizon was successful. In addition, participants in the control condition viewed time as expanded ($M_{\text{control}} = -2.5$), which differed from those in the limited condition ($t = -5.41, p < .001$) but was not significantly different from those in the expanded condition ($t = -5.41, p < .001$). This is consistent with previous findings that younger people (e.g., undergraduate students in our study) tend to have an expanded time horizon.

To determine whether the time horizon manipulation affected feelings of loneliness, we conducted three one-way ANOVAs for social, emotional, and global loneliness. As we predicted, responses to social ($F(2, 150) = .77, p > .5$), emotional ($F(2, 150) = .39, p > .7$), and global loneliness ($F(2, 150) = 2.5, p > .1$) scales did not differ across time horizon conditions. That is, the time horizon manipulation did not affect participants' relationship deficits. We did the same analyses for the rest of our studies and obtained similar results (Study 2: social, $F(1, 160) = 1.1, p > .3$; emotional, $F(1, 160) = .61, p > .4$; global, $F(1, 160) = 2.6, p > .11$; Study 3: social, $F(2, 431) = .87, p > .4$; emotional, $F(2, 431) = 2.2, p > .1$; global, $F(2, 431) = 2.5, p > .08$; Study 4: social, $F(1, 145) = 2.79, p > .1$; emotional, $F(1, 145) = 1.5, p > .2$; global, $F(1, 145) = .21, p > .2$).

**Impulsiveness.** We averaged the responses of two scenarios ($r = .81$) to create an index of impulsiveness. We first investigated the impact of global loneliness on consumers’ impulsiveness. A regression on the index of impulsiveness using global loneliness, time horizon perceptions, and their interaction as predictors revealed that none of these variables was a significant predictor of impulsiveness ($p > .1$). We used a similar analysis for all of our subsequent studies and obtained similar results ($p > .1$ for Study 1b; $p > .1$ for Study 2; $p > .1$ for Study 3; $p > .1$ for Study 4). However, global loneliness was a marginally significant predictor of

**Table 1**

| Summary Statistics: Social, Emotional, and Global Loneliness Across Time Horizons |
|---------------------------------|-----------|-----------|-----------|
|                                | Expanded  | Limited   | Control   |
|                                | M         | SD        | M         | SD        | M         | SD        |
| **Social Loneliness**          |           |           |           |
| (Standardized Score)           |           |           |           |
| Study 1a                        | -0.09     | .56       | -0.27     | .91       | -0.21     | .64       |
| Study 1b                        | .54       | .91       | -.46      | .84       |
| Study 2                         | .09       | .77       | -.08      | 1.2       |
| Study 3                         | .13       | .84       | -.03      | 1.3       |
| Study 4                         | -.02      | 1.1       | .26       | 1.0       |
| **Emotional Loneliness**        |           |           |           |
| (Standardized Score)            |           |           |           |
| Study 1a                        | -1.31     | .7        | -1.49     | 1.5       | -1.41     | .9        |
| Study 1b                        | .62       | 1.5       | -.55      | 1.2       |
| Study 2                         | -.09      | .93       | .04       | 1.1       |
| Study 3                         | -.07      | .84       | .13       | 1.3       |
| Study 4                         | -.37      | 1.5       | -.09      | 1.2       |
| **Global Loneliness**           |           |           |           |
| (Standardized Score)            |           |           |           |
| Study 1a                        | .52       | 1.4       | -.54      | 1.5       | .51       | 1.5       |
| Study 1b                        | .24       | 1.4       | -.47      | 1.81      |
| Study 2                         | .13       | .85       | -.13      | 1.1       |
| Study 3                         | .07       | 1.1       | .06       | 1.29      |
| Study 4                         | -.17      | 1.1       | .12       | 1.3       |

**Table 2**

| Summary Statistics: Social, Emotional, and Global Loneliness |
|-------------------------------------------------------------|
| **N** | **Min** | **Max** | **M** | **Mdn** | **SD** | **Alpha** |
|-------|---------|---------|-------|---------|--------|-----------|
| Social Loneliness (Possible Range: 5–35)                     |       |         |       |         |        |           |
| Study 1a                                           | 153   | 63      | 33    | 5       | 17     | 18       |
| Study 1b                                           | 77    | 64      | 29    | 8       | 19     | 18       |
| Study 2                                           | 162   | 63      | 32    | 7       | 19     | 18       |
| Study 3                                           | 434   | 63      | 29    | 8       | 19     | 20       |
| Study 4                                           | 147   | 66      | 31    | 9       | 20     | 20       |
| Emotional Loneliness (Possible Range: 10–70)              |       |         |       |         |        |           |
| Study 1a                                           | 153   | 63      | 63    | 14      | 29     | 31       |
| Study 1b                                           | 77    | 64      | 64    | 12      | 37     | 36       |
| Study 2                                           | 162   | 63      | 63    | 16      | 35     | 33       |
| Study 3                                           | 434   | 62      | 62    | 14      | 35     | 35       |
| Study 4                                           | 147   | 56      | 56    | 20      | 44     | 45       |
| Global Loneliness (Possible Range: 20–80)                |       |         |       |         |        |           |
| Study 1a                                           | 153   | 75      | 75    | 24      | 48     | 48       |
| Study 1b                                           | 77    | 75      | 77    | 24      | 43     | 44       |
| Study 2                                           | 162   | 77      | 77    | 27      | 45     | 45       |
| Study 3                                           | 434   | 74      | 74    | 26      | 43     | 44       |
| Study 4                                           | 147   | 70      | 70    | 23      | 51     | 52       |
impulsiveness ($\beta = .33, t = 1.94, p = .06$) in the control condition (without the time horizon manipulation).

Next, to test $H_1$, we regressed respondents’ impulsiveness on the relationship deficit index, time horizon, and their interaction. As we expected, the interaction between the relationship deficit index and time horizon was significant ($\beta = .53, t = 2.02, p < .05$). The main effects were not significant ($ps > .1$). To explore the nature of the interaction, we examined the slopes of the relationship deficit index at each time horizon level (expanded vs. limited vs. control). Emotionally lonely participants were more impulsive than socially lonely participants when they perceived time as limited ($\beta = -1.12, t = -3.45, p < .001$), whereas socially lonely participants were more impulsive than emotionally lonely participants when they perceived time as expanded ($\beta = 1.29, t = 3.89, p < .001$). The control condition was similar to the expanded time horizon condition: socially lonely participants were more impulsive than emotionally lonely participants ($\beta = .95, t = 3.34, p < .001$). Spotlight analyses (Aiken and West 1991) at one standard deviation above and below the mean of the relationship deficit index showed that socially lonely participants were more impulsive with an expanded time horizon than with a limited horizon ($\beta = .42, t = 3.87, p < .003$), whereas emotionally lonely participants were more impulsive with a limited time horizon than with an expanded time horizon ($\beta = -.31, t = 2.89, p < .01$; Figure 1). Participants in the control condition were not significantly different from socially lonely participants who perceived time as expanded ($\beta = .05, t = .58, p > .4$). Similarly, participants in the control condition were not significantly different from emotionally lonely participants who perceived time as expanded ($\beta = .04, t = .66, p > .4$).

**Controlling for other factors.** To rule out confounding factors of Study 1a results, we measured participants’ mood, need for uniqueness, need to belong, and depression tendency and created five indexes: positive affect ($\alpha = .84$) and negative affect ($\alpha = .82$) from the Positive Affect—Negative Affect Schedule scale, need to belong ($\alpha = .84$), need for uniqueness ($\alpha = .9$), and depression ($\alpha = .81$), following the same procedure and responding to the same measures as in the previous research (Beck 1978; Leary et al. 2007; Tian, Bearden, and Hunter 2001; Watson, Clark, and Tellegen 1988). Regression analyses on impulsiveness using the relationship deficit index, time horizon, and their interaction as predictors and the five indexes as covariates showed that the interaction between the relationship deficit index and time horizon remained significant ($\beta = .55, t = 2.02, p < .05$), whereas none of the five factors (positive affect, negative affect, need for uniqueness, need to belong, and depression) was significant ($ps > .1$). Spotlight analyses revealed the same pattern and significances as we have reported here. We conducted similar analyses, including the same five indexes as covariates for all of our subsequent studies, and the covariates were not significant in any of them ($ps > .1$ in Studies 1b, 2, 3, and 4), moreover, they did not affect any other results on the hypothesized effects.

**Discussion**

The results of Study 1a support our hypothesis that essential deficits are more likely to lead to impulsive behaviors than inessential deficits. Consistent with our prediction, this study demonstrates that it was not relationship deficits in general that affected impulsive behaviors (as suggested by previous research). Rather, only the relationship deficits that mattered to people with a particular time horizon perception were critical predictors of their impulsive behaviors. Moreover, we showed that the hypothesized effects remained significant after controlling for other factors such as affect, depression, need to belong, and need for uniqueness.

One point worth noting is that whereas previous research has suggested that social isolation leads to impulsivity, in our research, we did not find a significant relationship between global loneliness and impulsivity in either of the time horizon conditions. In our view, this was because we manipulated participants’ time horizons. The revised UCLA loneliness scale emphasizes the factual state of relationship deficits, whereas the SELSA-S focuses on the sources of such relationship deficits—social versus emotional. Therefore, the manipulation of time horizons might have made people more sensitive to the sources of relationship deficits; consequently, the global loneliness measure became less sensitive and less predictive of impulsive behaviors. However, consistent with previous research, global loneliness was a marginally significant predictor of impulsivity in the control condition, in which there was no time horizon manipulation.

In this study, we manipulated the time horizon perceptions of our participants, all of whom were undergraduate students. Previous research has suggested that, without a time horizon manipulation, the default view of time is limited for older adults and expanded for younger adults (Williams and Drolet 2005, p. 347). If so, our results should hold for actual age differences as well. Thus, we conducted Study 1b with younger and older participants and expected to replicate the results of Study 1a.

**STUDY 1B**

**Method**

Study 1b had a 2 (relationship deficits: social vs. emotional) × 2 (age: older vs. younger) between-subjects design. Thirty-eight older participants (55% female; $M_{\text{age}} = 58.7$ years; age range: 55–72 years) recruited from a Seniors Together in Aging Research database received $10 for their participation, and 39 younger participants (51% female; $M_{\text{age}} = 21.3$ years) were undergraduate students who received course credit for participation. Participants went through the same procedure and responded to the same measures as in
Study 1a, with three exceptions: we excluded the time horizon manipulation, replaced purchasing scenarios with actual consumption for the dependent variable, and measured loneliness before impulsivity. At the end of the study, all participants were thanked and told that they could help themselves to the cookies kept by the door. We recorded how many cookies each participant ate as the dependent variable.

Results

We measured participants’ impulsiveness as the number of cookies they ate. We calculated social ($\alpha = .79$) and emotional ($\alpha = .81$) loneliness using SELSA-S and computed participants’ relationship deficit index as in Study 1a. A regression analysis on impulsiveness with the relationship deficit index, age (older vs. younger), and their interaction revealed a significant interaction between the relationship deficit index and age ($\beta = -.31, t = -2.2, p < .03$). The main effects were not significant ($ps > .1$). Slope analyses showed that emotionally lonely older participants were more impulsive than socially lonely older participants ($\beta = -.86, t = -2.97, p < .004$), whereas socially lonely younger participants were more impulsive than emotionally lonely younger participants ($\beta = .97, t = 3.04, p < .001$). In addition, a spotlight analysis at one standard deviation above and below the mean of the relationship deficit index showed that socially lonely participants had greater impulsiveness when they were younger than older ($\beta = .39, t = 3.11, p < .003$), whereas emotionally lonely participants had greater impulsiveness when they were older than younger ($\beta = -.24, t = 2.78, p < .01$; Figure 2).

Discussion

The results of Study 1b replicated those of Study 1a, suggesting the robustness of the findings. These results provide evidence that younger people who are socially (vs. emotionally) lonely and older people who are emotionally (vs. socially) lonely are more likely to engage in impulsive behavior. Together, the results of Studies 1a and 1b support our proposition that the relationship deficits that mattered most to people of different age groups or time horizons led to more impulsive behavior.

In Study 1a, we used two indirect scenarios to measure impulsive purchases, assuming that participants would project themselves into the purchase scenarios. Although such measures reduced social desirability bias (Fisher 1993), it is unclear whether our results could be generalized to other situations in which people made actual purchases. Therefore, in the next study, we used a direct measure of impulsive purchasing to address this issue.

Studies 1a and 1b show that essential deficits led to more impulsive behaviors, but they did not shed light on the mechanism. We theorized that essential deficits lead to more impulsive behaviors because such relationship deficits deplete people’s self-regulatory resources. A resource-depletion model (Baumeister, Heatherton, and Tice 1994) has suggested that effortful self-regulation depends on a limited resource that is depleted by activities of self-regulation, thereby reducing subsequent performance on other self-regulatory tasks. If so, relationship deficits along the dimension that is most important to people (i.e., essential deficits) should deplete them to a greater extent and thus lead to more impulsive consumption than those deficits that are less important (i.e., inessential deficits). As a result, we hypothesized that essential deficits lead to more impulsive behaviors because such deficits deplete people’s self-regulatory resources.

**STUDY 2**

We designed Study 2 to demonstrate that essential deficits lead to more impulsive behaviors because they reduce self-regulatory resources ($H_2$). The study had a 2 (relationship deficits: social vs. emotional) $\times$ 2 (time horizon: limited vs. expanded) between-subjects design. We measured participants’ social and emotional relationship deficits and manipulated time horizons as in Study 1a. Participants made actual purchases of various products. Drawing from previous research (Agrawal and Wan 2009), we measured participants’ self-regulatory resources with their perseverance in a subsequent task. The dependent variables were both participants’ self-regulatory resources and the amount of money they spent on impulsive purchases. We predicted that people with essential deficits would spend more on impulsive purchases because their self-regulatory resources were depleted.

**Method**

One hundred sixty-two undergraduate participants (46% male; $M_{age} = 20.7$ years) were told that they would be taking part in four unrelated studies. In the first study, participants were randomly assigned to one of the two time horizon conditions, as in Study 1a. In the second study, following Vohs and Faber (2007), we created an impulsive spending situation in which participants were informed that they would be taking part in a campus bookstore study that involved the assessment of new products that the bookstore was thinking of introducing soon. Participants were given $10 and informed that they could use any, all, or none of their $10 to buy any quantity of products that were available as part of the campus bookstore study. Fifteen products (e.g., paper clips, index cards, travel napkins, mug holders) were displayed in a retail setup, ranging from as little as $.25 to as much as $3.00 apiece, and the number of choices was the same across conditions. Because participants were uninformed of the purchasing situation in advance, any spending would be impulsive. In the third study, participants were asked to solve a set of four anagrams, the last two of which were unsolvable (Agrawal and Wan 2009). Participants were informed that they could take as much
time as they wanted and stop at any time. The number of minutes spent on these anagrams served as our self-regulatory resource measure. In the fourth study, participants completed measures identical to those used in Study 1a.

Results

Manipulation check. A one-way ANOVA on the time horizon index (calculated as in Study 1a) revealed a significant main effect of time horizons ($F(1, 160) = 674.64, p < .001$). Participants in the expanded time horizon condition viewed time as more expanded ($M_{\text{expanded}} = -2.87$) than those in the limited time horizon condition ($M_{\text{limited}} = 2.64$).

Impulsive purchasing. We calculated social ($\alpha = .74$) and emotional ($\alpha = .7)$ relationship deficits using SELSA-S and computed the participants’ relationship deficit index similar to Study 1a. The dependent variable was the amount of money spent on impulsive purchasing. A regression analysis on the amount of money spent with the relationship deficit index, time horizon (expanded vs. limited), and their interactions showed a significant interaction ($\beta = -.44, t = -1.95, p < .05$; Figure 3). The main effects were not significant ($ps > .1$). Simple slope analyses indicated that emotionally lonely participants spent more money on impulsive purchasing than socially lonely participants when they perceived time as limited ($\beta = -.42, t = -2.59, p < .02$), whereas socially lonely participants spent more money on impulsive purchasing than emotionally lonely participants when they perceived time as expanded ($\beta = .39, t = 2.95, p < .01$). Spotlight analyses at one standard deviation above and below the mean of the relationship deficit index showed that emotionally lonely participants spent less time solving anagrams when they perceived time as limited than expanded ($\beta = -.89, t = -2.70, p < .02$), whereas the reverse was true for socially lonely participants ($\beta = -1.11, t = -3.96, p < .001$). Thus, the results confirm that essential deficits depleted participants’ self-regulatory resources more than inessential deficits.

Mediation analysis. To test our hypothesis that depletion mediates the effect of relationship deficits and time horizon on impulsivity, we performed a mediation analysis following Preacher and Hayes (2004) and Zhao, Lynch, and Chen (2010). The procedure generated a 95% confidence interval around the indirect effect, with zero falling outside the confidence interval (95% confidence interval = .04 to .15), suggesting that the mediating pathway was significant. The Sobel test also confirmed the mediating role of depletion ($z = 2.83, p < .02$). These results support our hypothesis that essential deficits result in depletion, which, in turn, leads to more impulsive behavior.

Discussion

In Study 2, we measured participants’ self-regulatory resources with their perseverance in a problem-solving task and assessed impulsivity with unplanned purchases. The results supported our hypothesis (H2) that people with essential (vs. inessential) deficits are more impulsive because their self-regulatory resources are depleted. Participants with essential deficits spent less time solving problems and spent more money on impulsive purchases.

Some could argue that people with essential (vs. inessential) deficits are more impulsive because the impulsive behaviors compensated for their essential deficits. To test this theory, we ran a post hoc analysis to examine whether people with essential deficits spent money on various products to compensate for their deficits. A regression analysis on compensatory impulsivity measure (“purchasing item(s) was intended to cheer myself up”; 1 = “not at all,” and 7 = “very much”) with the relationship deficit index, time horizon index (calculated as in Study 1a) revealed a significant interaction ($\beta = .89, t = 2.70, p < .02$), whereas the reverse was true for socially lonely participants ($\beta = -1.11, t = -3.96, p < .001$). Thus, the hypothesis that depletion mediates the effect of relationship deficits and time horizon on impulsivity was supported.

The mechanism. We measured participants’ self-regulatory resources with the time they spent solving the anagrams. A regression analysis on the number of minutes spent with the relationship deficit index, time horizon (expanded vs. limited), and their interactions as predictors supported our hypothesis with a significant interaction ($\beta = .81, t = 2.92, p < .01$; Figure 4). The main effects were not significant ($ps > .1$). Simple slope analyses showed that emotionally lonely participants spent less time solving anagrams than socially lonely participants when they perceived time as limited ($\beta = .77, t = 3.01, p < .01$), whereas socially lonely participants spent less time solving anagrams than emotionally lonely participants when they perceived time as expanded ($\beta = -.63, t = -3.21, p < .004$). Spotlight analyses at one standard deviation above and below the mean of the relationship deficit index showed that emotionally lonely participants spent less time solving anagrams when they perceived time as limited than expanded ($\beta = -.89, t = -2.70, p < .02$), whereas the reverse was true for socially lonely participants ($\beta = -1.11, t = -3.96, p < .001$). Thus, the results confirm that essential deficits depleted participants’ self-regulatory resources more than inessential deficits.

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zonz (expanded vs. limited), and their interactions as predictors showed that the interaction was not significant ($\beta = -.05$, $t = -6.9$, $p > .5$), suggesting that participants did not make impulsive purchases to compensate for their relationship deficits. To increase the robustness of our findings, in the next study, we manipulated depletion instead of measuring it and measured impulsivity in terms of short-term gratification rather than unplanned consumption.

**STUDY 3**

The design of Study 3 was a 2 (relationship deficits: social vs. emotional) × 3 (time horizon: expanded vs. limited vs. control) × 2 (self-regulatory resources: depleted vs. not depleted) between-subjects design in which we measured participants’ social and emotional relationship deficits using the SELSA-S and manipulated time horizon as in Study 1a. We manipulated participants’ self-regulatory resources with a depletion task from previous research (Baumeister et al. 1998). The dependent variable was actual food consumption. We hypothesized that people with essential deficits are more impulsive because their self-regulatory resources are depleted. If so, a separate task that depleted people with inessential deficits should result in similar increased impulsivity. Therefore, we predicted that when their self-regulatory resources are depleted, people with inessential deficits should be equally likely to engage in impulsive behaviors as people with essential deficits.

**Method**

Four hundred thirty-four undergraduate students (54% male; $M_{age} = 21.3$ years) participated in this study in exchange for course credit. Participants were told that they would take part in three unrelated studies. In the first study, each participant was randomly assigned to one of the three time horizon conditions in which the manipulation was the same as in the previous studies. Then, approximately half the participants in each time horizon condition were randomly assigned to one of the two self-regulatory resource conditions (depleted vs. not depleted) adopted from Baumeister et al. (1998). Participants were given a page of text and were told to cross out all instances of the letter e. In the depletion condition, the task was quite difficult, requiring participants to follow multiple rules and monitor their decisions carefully: Participants were told that they should only cross out an e if it was not adjacent to another vowel or two letters away from another vowel (e.g., the e in “vowel” should not be crossed out). In contrast, participants in the no-depletion condition were told to cross out every e with no further rules or stipulations. For the Regulatory-depletion manipulation check, participants responded to a two-item, seven-point scale (1 = “not at all,” and 7 = “extremely”) that measured to what extent they felt “exhausted” and “drained” after crossing out all instances of the letter e (using the rules they received). In the third study, all participants completed measures identical to those used in Study 1a. They were also given a cup of chocolates (Hershey’s Kisses) as part of the study and were told that they could help themselves to the chocolates. We recorded how many chocolates each participant ate as the dependent variable.

**Results**

**Manipulation checks.** A one-way ANOVA on the time horizon index (calculated the same as in the previous studies) revealed a significant main effect of time horizon per-

ception ($F(2, 431) = 733.29, p < .001$) such that participants in the expanded time horizon condition viewed time as more expanded and participants in the limited time horizon condition viewed time as more limited ($M_{expanded} = 2.95$ vs. $M_{limited} = 2.56; t = -8.11, p < .001$), implying that the manipulation of time horizon was successful. Participants in the control condition viewed time as expanded ($M_{control} = 2.62$), which differed from those in the limited condition ($t = -7.19, p < .001$) but not from those in the expanded condition ($t = .82, p > .3$). We created a depletion index by averaging the two depletion items ($r = .91$). Another one-way ANOVA on the depletion index revealed that participants in the depletion condition reported being more depleted by the task of crossing out the e than participants in the no-depletion condition ($M_{depletion} = 2.58$ vs. $M_{no-depletion} = 2.356, p < .001$).

**Impulsiveness.** We measured participants’ impulsiveness with the number of chocolates they ate. We calculated social (α = .6) and emotional (α = .73) relationship deficits using the SELSA-S and computed participants’ relationship deficit index as in Study 1a. A regression analysis on impulsiveness with the relationship deficit index, time horizon, depletion, and their interactions supported our hypothesis with a significant three-way interaction ($\beta = .52, t = 2.12, p < .04$; Figure 5).

The main effects and two-way interactions were not significant ($p > .1$). Simple slope analyses indicated that without depletion, emotionally lonely participants ate more chocolate than socially lonely participants when they perceived time as limited ($\beta = -.83, t = -2.97, p < .01$), whereas socially lonely participants ate more chocolate than emotionally lonely participants when they perceived time as expanded ($\beta = 1.15, t = 3.11, p < .001$). The control condition was similar to the expanded time horizon condition: socially lonely participants ate more chocolate than emotionally lonely participants ($\beta = 1.01, t = 3.03, p < .001$). However, when participants were depleted, relationship deficits did not affect impulsiveness, regardless of whether participants perceived time as limited ($\beta = .07, t = .67, p > .4$) or expanded ($\beta = .04, t = .59, p > .4$) or were in the control group ($\beta = .06, t = .62, p > .4$).

Spotlight analyses at one standard deviation above and below the mean of the relationship deficit index showed that in the no-depletion condition, emotionally lonely participants were more impulsive when they perceived time as limited than expanded ($\beta = -1.12, t = -2.77, p < .02$), whereas the reverse was true for socially lonely participants ($\beta = 1.34, t = 4.54, p < .001$). In contrast, participants in the control condition were not significantly different in impulsiveness from participants with an expanded time horizon (social deficits: $\beta = .03, t = .54, p > .4$; emotional deficits: $\beta = .02, t = .42, p > .5$). In the depletion condition, however, time horizon perceptions did not affect impulsiveness, regardless of whether participants were emotionally lonely ($\beta = .11, t = .59, p > .4$) or socially lonely ($\beta = .19, t = .61, p > .4$). Thus, the results confirmed that when people with inessential deficits are depleted by other unrelated tasks, they are equally as impulsive as people with essential deficits.

**Discussion**

By using actual consumption behavior, we demonstrate in Study 3 that inessential deficits can also lead to impulsive behaviors when people’s self-regulatory resources are depleted by other tasks. However, in the no-depletion con-


dition, we replicated the results of previous studies. These results are consistent with our hypothesis that essential (vs. inessential) deficits result in more impulsive behaviors because they deplete self-regulatory resources (H2).

In the next study, we tested our second hypothesis on the mediating role of depletion from a different perspective. Previous research has shown that when depleted people reflect on their core values, such self-affirmation reduces depletion and should make regulatory resources available that could be used to control subsequent impulsive behavior. Thus, we predicted that with affirmation on essential relationships, people with essential deficits would act similarly to people with inessential deficits and engage in reduced impulsive behavior.

**Method**

One hundred forty-seven undergraduate students (45% male; M_{age} = 21.8 years) participated in this study in exchange for course credit. First, each participant was randomly assigned to one of two time horizon conditions, in which the manipulation was the same as in the previous studies. Then, roughly half the participants in each time horizon condition were randomly assigned to one of three self-affirmation conditions (family vs. friend vs. control; Schmeichel and Vohs 2009), in which they completed a short writing task for five minutes. For the friend-affirmation (family-affirmation) manipulation, participants wrote an essay explaining why relationships with their friends (families) were important to them, and they described a time in their lives when these relationships were particularly important. Participants in the control (no-affirmation) condition wrote an essay explaining relationships among items from the surroundings of the study room (e.g., tables, chairs). Finally, all participants completed measures identical to those used in Study 1a and received a cup of chocolates (Hershey’s Kisses) to which they could help themselves. We recorded how many chocolates each participant ate as the dependent variable.

**Results**

**Manipulation checks.** A one-way ANOVA on the time horizon index (calculated as in the previous studies) revealed a significant main effect of time horizon perception (F(1, 145) = 35.95, p < .001) such that participants in the expanded time horizon condition viewed time as more expanded and participants in the limited time horizon condition viewed time as more limited (M_{expanded} = –2.33 vs. M_{limited} = 2.84; t = –6.05, p < .001). These findings suggest that the manipulation of time horizon was successful.

**Impulsiveness.** We measured participants’ impulsiveness with the number of chocolates they ate. We calculated social (α = .62) and emotional (α = .73) relationship deficits using the SELSA-S and computed participants’ relationship deficit index as in Study 1a. A regression analysis on impulsiveness with the relationship deficit index, time horizon, depletion, and their interactions supported our hypothesis with a significant three-way interaction (β = 1.08, t = 1.93, p = .056; Figure 6). The main effects and two-way interactions were not significant (ps > .1). Simple slope analyses indicated that when participants perceived time as expanded, socially lonely participants ate more chocolates than emotionally lonely participants after affirming relationships with their families (β = .93, t = 3.02, p < .01) and without any affirmation (β = .89, t = 2.95, p < .01). How-

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**Figure 5**

**Impulsivity as a Function of Relationship Deficits, Time Horizon Perceptions, and Resource Depletion (Study 3)**

![Graph showing impulsivity as a function of relationship deficits and time horizon perceptions.](image-url)
Moreover, socially lonely participants ate a similar number of chocolates as emotionally lonely participants when they affirmed relationships with their friends ($\beta = .11, t = 2.22, p > .05$). Notably, when participants perceived time as limited, emotionally lonely participants ate more chocolates than socially lonely participants, including after affirming relationships with their families and friends ($\beta = 1.09, t = 3.22, p < .001$) and without any affirmation ($\beta = .91, t = 3.01, p < .001$). However, emotionally lonely participants ate a similar number of chocolates as socially lonely participants when they affirmed relationships with their families ($\beta = .09, t = .95, p > .3$).

Spotlight analyses at one standard deviation above and below the mean of the relationship deficit index showed that when participants perceived time as expanded, socially lonely participants were more impulsive when they affirmed relationships with their families than when they affirmed relationships with their friends ($\beta = 1.12, t = 3.11, p < .001$), but socially lonely participants were equally impulsive in the family affirmation condition and in the control condition ($\beta = .02, t = 12, p > .3$). Emotionally lonely participants were not significantly different in impulsiveness when they affirmed relationships with their families and friends ($\beta = .05, t = .48, p > .7$) and without an affirmation ($\beta = .2, t = .29, p > .6$).

However, when participants perceived time as limited, emotionally lonely participants were more impulsive when they affirmed relationships with their friends than with their families ($\beta = -1.19, t = -3.22, p < .001$), but emotionally lonely participants were equally impulsive in the friend affirmation and control conditions ($\beta = -29, t = .55, p > .5$). Socially lonely participants were not significantly different in impulsiveness when they affirmed relationships with their families and friends ($\beta = .11, t = 2.22, p > .05$) or in the no-affirmation condition ($\beta = .09, t = .2, p > .7$). Thus, the results confirmed that when people with essential deficits affirm their existing essential relationships, their impulsive behaviors decreased, and they became equally less impulsive than those with inessential deficits.

Discussion

By using actual consumption behavior, we demonstrate in Study 4 that when people with essential deficits do not deplete their regulatory resources, their impulsive behaviors diminish. These results are consistent with our hypothesis that essential (vs. inessential) deficits result in more impulsive behaviors because they deplete self-regulatory resources ($H_2$).

In this study, we asked participants to reflect on their existing social or emotional relationships and showed that affirmation of existing essential (but not inessential) relationships reduced depletion and impulsivity. Note that the assumption behind such manipulation is that all participants had some social or emotional relationships, but they felt socially or emotionally lonely because certain types of relationships they had did not meet their expectations. However, it is conceivable that in extreme conditions in which someone is in absolute isolation (i.e., with no friends, family members, or significant others at all), dwelling on nonexistent relationships could intensify their feelings of loneliness. Thus, further research should use this manipulation with caution.

GENERAL DISCUSSION

American society seems to be more socially isolated; people have fewer interactions with others (Putnam 2000), fewer people to confide in (McPherson, Smith-Lovin, and Brashears 2006), and a lower quality of relationships with family and friends (Gross 2004; Richards et al. 2010). Given that interpersonal connections are essential to human survival (Baumeister et al. 2005), the absence of intimate and social interactions can lead to undesirable behaviors, such as impulsive consumption. Yet some questions remain: Is there only one type of relationship deficit? Do relationship deficits affect people with different time horizons in the same way? We examined these central questions in the area of consumers’ impulsive behaviors.

We hypothesized and revealed that time horizon perceptions moderate the effect of different types of relationship deficits on consumers’ impulsive behaviors. Specifically, we found that people are more likely to engage in impulsive behaviors when they have essential (vs. inessential) relationship deficits. We also found support for our hypothesized underlying mechanism: people with essential deficits are more impulsive because their self-regulatory resources are depleted.

Methodologically, we used different operationalizations of the impulsivity construct and obtained convergent results. We observed the same effect of time horizon perceptions and relationship deficits on impulsive behaviors, whether impulsivity was manifested as unplanned purchases (Studies 1a and 2) or as a preference for short-term gratification (Studies 1b, 3, and 4). In addition, convergent
results, in terms of both self-reported impulsivity (Study 1a) and actual impulsive behaviors (Studies 1b, 2, 3, and 4), increased the robustness of our findings. We also observed the same results by employing either a temporary manipulation of time horizon (Studies 1a, 2, 3, and 4) or a proxy of time horizon by recruiting participants from different age groups (Study 1b). Finally, we controlled for several variables (individual affect, need for uniqueness, need to belong, and depression) to rule out factors that could potentially affect our results, and our results remained robust.

Our research makes important theoretical contributions by identifying the joint effect of time horizon perceptions and relationship deficits on impulsive behaviors. First, our research adds to the understanding of how and when lonely consumers engage in impulsive behaviors. The previous literature treating loneliness as a unidimensional construct has suggested that lonely consumers are impulsive, regardless of whether the loneliness is due to a lack of intimate attachment or general social connections. We identified to what extent social versus emotional relationship deficits can be associated with impulsive behaviors on the basis of whether people perceive time as expanded or limited. Our findings suggest that only deficits of essential relationships (determined by time horizons) lead to impulsivity. It is important to distinguish emotional and social relationship deficits because it adds to the understanding of how and when lonely consumers will engage in various impulsive behaviors. In addition, our research identifies the underlying mechanism of why essential deficits lead to more impulsive behaviors; because the experience of essential deficits depletes people.

This research also contributes to the social exclusion literature. Previous research on social exclusion has shown that it fosters aggressiveness (Twenge et al. 2001), self-defeating behaviors (Twenge, Catanese, and Baumeister 2002), intellectual impairment (Baumeister, Twenge, and Nuss 2002), and a lack of self-regulatory resources (Baumeister et al. 2005). For example, a common manipulation of social exclusion is to tell participants “no one chose you as someone they wanted to work with” (Twenge et al. 2001). However, this manipulation actually falls within the social dimension rather than the emotional (intimate) dimension. Such studies have shown that social exclusion leads to impulsivity. However, our research suggests that the link between social exclusion and impulsive behaviors may be relevant only to younger people, because social (vs. emotional) relationships are of higher priority for younger people, who are more likely to perceive the time horizon as expanded (Carstensen 1992). Indeed, most of the prior studies demonstrating the relationship between social exclusion and impulsive behaviors (e.g., DeWall et al. 2007; Vohs and Faber 2007) have recruited undergraduate participants. In our research, social relationship deficits also led to impulsivity when the time horizon was expanded. Our contribution is to vary the time horizon systematically and to examine how it affects impulsivity with different types of relationship deficits. In other words, the previous literature on social exclusion does not address how emotional relationship deficits affect impulsivity, because none of the previous studies has examined how a lack of intimate emotional attachment affects impulsivity.

Although the theory of SST suggests that people with an expanded time horizon should focus more on social (vs. emotional) relationships, there have been some mixed find-
ever, relationship deficits could also be the result of situational factors, such as moving to college (Shaver, Furman, and Buhrmester 1985). For example, Shaver, Furman, and Buhrmester (1985) find that at the beginning of freshman year, college students are lonelier because they are less satisfied with their friendship network. As they live on campus, their friendship network improves and their felt loneliness decreases. Future researchers could investigate whether our findings could be observed for temporary relationship deficits as well.

Second, the previous literature has not shed any light on the relationship between social and emotional loneliness, other than emphasizing the distinction between the two (Weiss 1973). In our research, we show that although social and emotional loneliness are correlated, they have unique consequences in terms of impulsivity. Future studies could further examine the relationship between the two forms of loneliness and whether they affect impulsivity additively.

Third, the previous literature has suggested that lonely people may be chronically depleted because they have higher anxiety, anger, negative affect (Cacioppo et al. 2006), and reduced sleep efficiency (Cacioppo et al. 2002). In this research, we further proposed that time horizon perceptions emphasizing essential relationship deficits should lead to greater depletion than time horizon perceptions focusing on inessential relationship deficits. Although, drawing on previous research, we treated depletion as a chronic variable in our theory, we also showed that temporary manipulations of time horizon perceptions can highlight essential relationship deficits and, consequently, can further increase depletion. Future studies should investigate in more detail whether chronic versus temporarily induced depletion affects impulsivity additively or in different ways.

Fourth, the early impulse-buying literature (Rook 1987) has attempted to classify likely versus unlikely impulsive products on the basis of their categories, suggesting that the effect of relationship deficits and time horizon perceptions on impulsivity may vary depending on whether the product is emotional (e.g., something for Mother’s Day) or social (e.g., something for coworkers). Further research could extend our findings by examining the moderating role of such product goals and investigating the combined effects of relationship deficits, time horizon perceptions, and product goals on impulsive behaviors.

Fifth, as demonstrated in this research that depletion mediates the effect of essential relationship deficits on impulsivity. However, there could be other mediators or moderators to this effect. For example, people feeling essential deficits might engage in impulsive behaviors to compensate for a lack of the relationships most important to them. Although a post hoc analysis of Study 2 data suggested otherwise, further research could test this hypothesis and compare it with the depletion mechanism.
APPENDIX B: THE SELSA-S

1 = “strongly disagree,” and 7 = “strongly agree”

Social Loneliness Subscale
1. I feel part of a group of friends.
2. My friends understand my motives and reasoning.
3. I don’t have any friends who share my views, but I wish I did.
4. I am able to depend on my friends for help.
5. I do not have any friends who understand me, but I wish I did.

Emotional Loneliness Subscales

Family Subscale
1. I feel alone when I am with my family.
2. There is no one in my family I can depend on for support and encouragement, but I wish there was.
3. I feel close to my family.
4. I feel part of my family.
5. My family really cares about me.

Romantic Subscale
1. I have a romantic partner with whom I share my most intimate thoughts and feelings.
2. I have a romantic or marital partner who gives me the support and encouragement I need.
3. I wish I had a more satisfying romantic relationship.
4. I have a romantic partner to whose happiness I contribute.
5. I have an unmet need for a close romantic relationship.

APPENDIX C: DETAILED DESCRIPTION OF THE SCENARIOS AND DECISION OPTIONS (STUDY 1A)

First Scenario
“Lucy is a 21-year-old college student with a part-time job. It is two days before Lucy gets her next paycheck and she has only $25 left for necessities. In addition to food, Lucy needs to buy a scientific calculator for her finance class the next morning (she just broke her old calculator). After work, she goes to the mall to purchase the calculator. As she is walking through J.C. Penney, Lucy sees a great looking Bulova dress watch on sale for $85.”

What do you think Lucy should do about the Bulova dress watch?
Not buy the Bulova dress watch
Buy the Bulova dress watch

1 2 3 4 5 6 7

Second Scenario
“Bob is a 22-year-old college student with a part-time job. It is two days before Bob gets his next paycheck and he has only $25 left for necessities. In addition to food, Bob needs to buy a USB flash drive; he just lost his old flash drive. After work, he goes to the mall to purchase the flash drive. As he is walking through Target, Bob sees a great looking iHome Stereo Clock Radio on sale for $85.”

What do you think Bob should do about the iHome Stereo Clock Radio?
Not buy the iHome Stereo Clock Radio
Buy the iHome Stereo Clock Radio

1 2 3 4 5 6 7

APPENDIX D: TIME HORIZON MANIPULATION CHECK QUESTIONS (STUDY 1A)

Please circle the number below that reflects your feeling about following sentence.

Strongly Disagree
1 2 3 4 5 6

Strongly Agree

“Life is long” (“Life is short”) for expanded (limited) time horizon manipulation.
1. This statement made me think about endings.
2. This statement made me think time is limited.
3. This statement made me think about the present.
4. This statement made me think about beginnings.
5. This statement made me think time is limitless.
6. This statement made me think about the future.

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