Essays on the Determinants of Prosocial Behavior in Singapore

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Abstract

Previous research has sought to explain why people engage in prosocial behavior and undertake activities that are costly to themselves and mostly benefit others, such as volunteering and donating. My dissertation comprises three essays that collectively explore the determinants of prosocial behavior and leverages insights from behavioral economics to design interventions to nudge people to behave more prosocially. The first essay is an observational study that examines how rapid demographic changes reduced informal volunteering but not formal volunteering in Singapore. The findings suggest that structural factors such as racial diversification and the availability of institutions that promote inclusiveness could be more important than individual-level characteristics in explaining prosocial behavior. The second essay is a field experiment that explores how tailoring messages to resonate with peoples' underlying motivations for volunteering can increase their likelihood of actually volunteering. The third essay examines how behavioral modifications to public engagement campaigns can increase their effectiveness in changing behaviors. Overall, the second and third essays suggest that actual volunteering behavior is the realization of interactions between innate propensities to volunteer and situational factors. For example, non-volunteers might have a lower predisposition for volunteering compared to current volunteers, but they can still be nudged to volunteer if exposed to the appropriate type of messaging. Similarly, individuals with high prosocial tendencies might never get around to volunteering because they procrastinate or possess time-inconsistent preferences. We therefore have to account for situational factors in order to develop a complete understanding of why people behave prosocially.

Contents

1 Demographic Changes, Social Cohesion and Civic Engagement: The Effect of Racial Diversification on Volunteering Behavior . . . 1

1.1 Introduction . . . 2
1.2 Racial Diversity, Racial Diversification, and Socioeconomic Outcomes . . . 5
1.2.1 Racial Diversity: Contact and Context . . . 5
1.2.2 Racial Diversification and Socioeconomic Outcomes . . . 7
1.3 Singapore as a Case Study . . . 10
1.3.1 Racial Diversification in Singapore . . . 10
1.3.2 Living in Singapore . . . 13
1.4 Data and Identification Strategy . . . 15
1.4.1 Overview of Data . . . 16
1.4.2 Nonrandom Selection into Residential Neighborhoods . . . 19
1.4.3 Empirical Strategy . . . 24
1.5 Findings . . . 24
1.5.1 Did Racial Diversification Reduce Formal and Informal Volunteering? . . . 25
1.5.2 The Control Variables . . . 28
1.5.3 Robustness Checks . . . 31
1.6 Conclusion . . . 35

2 Micro-Targeting Appeals to Encourage Prosocial Behavior: Evidence from a Field Experiment on Volunteering . . . 37

2.1 Introduction . . . 38
2.2 Theory: Designing Micro-Targeted Messages to Get People to Volunteer . . . 42
2.3 Experimental Design . . . 51
2.3.1 Experimental Design: Random Assignment to Treatments . . . 51
2.3.2 Experimental Timeline . . . 52
2.4 The Experimental Data and Evaluation Strategy . . . 56
2.4.1 Overview of Data . . . 56
2.4.2 Evaluating Covariate Balance Across Treatment and Control Groups . . . 57
2.4.3 Evaluation Strategy . . . 60
2.5 Experimental Findings . . . 60

2.5.1 Did Volunteering Behavior Vary by Volunteer Status? 60
2.5.2 Did Contextual Information Increase Volunteering Behavior? 61
2.5.3 Did Motivational Frames Increase Volunteering Behavior? 61
2.6 Conclusion 65

3 Leveraging Behavioral Insights to Improve the Efficacy of Public Engagement Campaigns: Experimental Evidence from Singapore 67
3.1 Introduction 68
3.2 Emergency Preparedness in Singapore 72
3.2.1 The Community Emergency Preparedness Program 74
3.2.2 The Post-Fire Blitz Campaign 76
3.3 Theory: Designing Public Engagement Campaigns To Change Behavior 77
3.4 Experimental Design 84
3.4.1 Experimental Design: Random Assignment to Treatments 84
3.4.2 Experimental Timeline 90
3.5 The Experimental Data 92
3.5.1 Overview of Data 92
3.5.2 Evaluating Covariate Balance Across Treatment and Control Groups 94
3.6 Evaluation Strategy 96
3.6.1 One-Sided Noncompliance 96
3.6.2 Cluster Randomization and Causal Inference 99
3.6.3 Evaluation Strategy 100
3.7 Experimental Findings 101
3.7.1 Did Contextual Frames Increase CEPP Interest? 101
3.7.2 Did Contextual Frames Increase CEPP Attendance? 103
3.7.3 Did Follow-Through Prompts Increase CEPP Attendance? 104
3.7.4 Interaction Effects: Contextual Frames and Preregistration Package 106
3.8 Conclusion 108

List of Figures

1.1 Planned Communities: East Region 14
1.2 Planned Communities: Pasir Ris Planning Area 14
1.3 Planned Communities: Elias Park Subzone 15
1.4 Geospatial Overview of Tampines New Town 21
1.5 Selecting a HDB Neighborhood for First-Time Buyers 22
1.6 Selecting a HDB Block for First-Time Buyers 23

2.1 Blank Postcard Given to Respondents Who Were Interested to Volunteer 45
2.2 Motivations for Volunteering 47
2.3 Blank Postcard Given to Respondents Who Were Interested to Volunteer 55
2.4 Volunteer Behavior Across Motivational Frames, Among Current Volunteers 62
2.5 Volunteer Behavior Across Motivational Frames, Among Former Volunteers 63
2.6 Volunteer Behavior Across Motivational Frames, Among Non-Volunteers 64

3.1 Information Package: Printed Map With Directions to CEPP Locations 80
3.2 Information Package: Printed Information Schedule on Upcoming CEPP Sessions . 81
3.3 Appointment Postcard Provided to Respondents Who Preregistered for the CEPP . 82
3.4 Overview of Ideal Experimental Design 85
3.5 Overview of Ideal Experimental Design 88
3.6 CEPP Interest Across Contextual Framing Groups 102
3.7 CEPP Attendance Across the Follow-Through Prompt Treatment Groups 105
3.8 CEPP Attendance Across the Engagement Prompt Treatment Groups 107

List of Tables

1.1 Summary of Variables from the Dataset 17
1.2 2010 Ethnic Quotas in HDB Neighborhoods and Blocks 21
1.3 The Effect of Racial Diversification on the Likelihood of Formal Volunteering . . . 26

1.4 The Effect of Racial Diversification on the Likelihood of Informal Volunteering . . 27
1.5 Comparison of the Predictors of Formal and Informal Volunteering 29
1.6 Robustness Check: Excluding Outliers from the Analyses 33
1.7 Robustness Check: Robustness Check: Multilevel Logistic Regressions 34

2.1 Description of Motivations for Pro-social Behavior 48
2.2 Summary of Motivational Frame Treatments 49
2.3 The 2 X 4 Factorial Design 52
2.4 The Experimental Timeline 53
2.5 Randomization Across Treatment Groups 57
2.6 Comparison of Demographic Profile of IGS 2014 Sample and National Population . 57
2.7 Overview of Treatment and Control Groups for Contextual Information 59
2.8 Overview of Treatment and Control Groups for Motivational Frames 59

3.1 The 2 X 2 Factorial Design 87
3.2 The Experimental Timeline 91
3.3 Randomization Across Treatment Groups 92
3.4 Comparison of Demographic Profile of Post-Fire Blitz Sample and National Population 93
3.5 Overview of Treatment and Control Groups 95
3.6 One-Sided Noncompliance Among Residents Assigned to Receive the Preregistration Package 97
3.7 The Effect of Contextual Framing on CEPP Interest 103
3.8 The Effect of Contextual Framing on CEPP Attendance 104
3.9 Intention-Behavior Gap Among Respondents 104
3.10 The Effect of Follow-Through Prompts on CEPP Attendance 106

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Chapter 1

Demographic Changes, Social Cohesion and Civic Engagement: The Effect of Racial Diversification on Volunteering Behavior

We examine how racial diversification influenced social cohesion and civic engagement in Singapore, a racially heterogeneous, multicultural city-state that experienced a rapid influx of immigrants in the 2000s. We focus on formal and informal volunteering, two types of prosocial behaviors. Formal volunteering refers to volunteering activity that occurs through participation in an organization, whereas informal volunteering refers to volunteering activity that occurs individually outside an organizational context, such as helping one's neighbors. We construct a novel dataset that combines individual-level survey data on formal and informal volunteering with neighborhood-level census data on racial demographics. We find that racial diversification reduced the likelihood of informal volunteering but had no effect on formal volunteering. Interestingly, racial heterogeneity had no effect on volunteering behavior. Our findings add a layer of nuance to intergroup contact and racial threat theory by suggesting that it is the pace of racial diversification,

rather than racial heterogeneity per se, that influences socioeconomic outcomes.

1.1 Introduction

Economic globalization has spurred increased migration from developing to developed countries in the past decade, with the share of international migrants in developed countries rising from 8.7 percent in 2000 to 10.3 percent in 2010.[1] The rapid influx of immigrants has transformed the demographic composition of host nations within a short period of time. Such changes have arguably strained the social fabric underlying many local communities, as cross-cultural clashes have fuelled concerns about the cultural impact of immigration and given rise to anti-immigrant sentiment and exclusionary attitudes among the native-born populace (Enos 2014; Hainmueller and Hopkins 2014). Since global migration is expected to increase further[2], understanding the implications of changing demographics for social cohesion and civic engagement has become a key priority for policymakers. Yet with the exception of (Hopkins 2009, 2010), most scholars have focused on the level of racial diversity and its effect on socioeconomic outcomes, rather than on changes in the level of racial diversity. They find that racially diverse communities tend to be more fractured — they are less supportive of welfare spending (Luttmer 2001), contribute less to public goods (Alesina, Baqir and Easterly 1999; Miguel and Gugerty 2005; Habyarimana et al. 2007), participate less in formal organizations (Alesina and Ferrara 2000), and have lower levels of interpersonal trust (Alesina and Ferrara 2002) and social capital (Costa and Kahn 2003; Putnam 2007; Laurence 2011). However, the effect of racial heterogeneity also depends critically on contextual factors such as institutional arrangements that promote inclusivity (Kesler and Bloemraad 2010), size of the community (Aizlewood and Pendakur 2005; Clark and Kim 2012), socioeconomic status of the

[1] http://esa.un.org/migration/
[2] http://esa.un.org/migration/

neighborhood (Letki 2008), and the pace at which the community is diversifying (Hopkins 2009, 2010). In other words, racial heterogeneity does not necessarily equate with lower levels of social cohesion and civic engagement; the process by which communities became diverse also matters. The true impact of racial diversification on socioeconomic outcomes is therefore unknown.[3]

Our study examines how racial diversification influenced social cohesion and civic engagement in Singapore, a racially heterogeneous, multicultural city-state that experienced a rapid influx of immigrants in the 2000s — the percentage of the foreign-born population rose from 25.9 percent in 2000 to 36.4 percent in 2010, an increase of 40.6 percent.[4] Unlike previous work, our measure of social cohesion and civic engagement focuses on volunteering, a type of prosocial behavior and a form of public goods provision.[5] Volunteering refers to activities undertaken freely to help others outside one's household, family, or relatives, without any expectation of financial compensation (NVPC 2012). We further distinguish between two forms of volunteering: formal and informal. Formal volunteering refers to volunteering activity that occurs through participation in an organization, whereas informal volunteering refers to volunteering activity that occurs individually outside an organizational context, such as helping one's neighbors.

Overall, volunteers generate significant economic and social value for their communities. For example, 64.5 million volunteers in the United States contributed an estimated $175 billion worth of services in 2012;[6] volunteers are also happier (Thoits and Hewitt 2001; Borgonovi 2008; Meier and Stutzer 2008) and have more meaningful connections with their community (Chinman and Wandersman 1999). Put differently, volunteering encompasses participation in the civic life of a community through formal organizations and informal social interactions and is an important ingredient for developing crosscutting social bonds. It therefore serves as a good measure of the

[3] For an excellent overview on how racial diversity affects economic outcomes, see Alesina and Ferrara (2005).
[4] http://www.singstat.gov.sg/statistics/browse_by_theme/population.html
[5] Benabou and Tirole (2006) define prosocial behavior as "costly activities that primarily benefit others.
[6] http://www.volunteeringinamerica.gov/national

level of social cohesion and civic engagement in a society.[7]

We construct a novel dataset that combines individual-level survey data on formal and informal volunteering from the 2012 Individual Giving Survey with neighborhood-level census data on racial demographics from 2000 and 2010. We define racial diversification as the percentage change in the proportion of racial out-groups between 2000 and 2010, and implement logistic regression analyses to examine how neighborhood-level racial diversification influenced respondents' likelihood of engaging in formal and informal volunteering behavior in 2012.

The empirical findings suggest that racial diversification reduced the likelihood of informal volunteering but had no effect on formal volunteering. Specifically, a person living in an average neighborhood that underwent racial diversification during the 2000s was 20.5 percent less likely to engage in informal volunteering in the year 2012, compared to a person living in a demographically static neighborhood. Interestingly, neighborhood-level racial diversity — the proportion of racial out-groups — had no effect on volunteering behavior.

Overall, our study extends the main findings from Alesina and Ferrara (2000), Costa and Kahn (2003), and Putnam (2007) by examining the effect of racial diversification — rather than racial heterogeneity — on social cohesion and civic engagement, using a new set of data on volunteering behavior in a non-Western context. The regression analyses suggest that racial heterogeneity lowers social cohesion and civic engagement, but only in communities that are rapidly diversifying. Our findings add a layer of nuance to intergroup contact and racial threat theory (Allport 1954; Blalock 1967; Pettigrew and Tropp 2006; Dancygier 2007) by suggesting that it is the pace of racial diversification, rather than racial heterogeneity per se, that influences socioeconomic outcomes. Initial contact with racial out-groups might incite fear and prompt exclusionary and prejudicial attitudes toward the other, but repeated exposure to and interaction with out-groups could

[7] See Rajulton, Ravanera and Beaujot (2007) and Letki (2008) for more on how volunteering can be used to measure social cohesion.

generate bridging and bonding social capital that mitigate these negative reactions over time Enos (2014). Moreover, shared identities and common understandings that emerge from repeated intergroup contact could serve as rallying points for inter-ethnic cooperation (Charnysh, Lucas and Singh 2015). Policymakers should thus focus their efforts on integrating immigrants, rather than excluding them.

The rest of the paper proceeds as follows. Section 2 presents the theory on racial diversification and its effect on socioeconomic outcomes. Section 3 motivates the use of Singapore as a case study. Section 4 presents the data and outlines the identification strategy for dealing with nonrandom selection into residential neighborhoods. Section 5 presents the findings. Section 6 concludes.

1.2 Racial Diversity, Racial Diversification, and Socioeconomic Outcomes

1.2.1 Racial Diversity: Contact and Context

How does racial diversity influence social cohesion and civic engagement? Two prominent research traditions in the social sciences have emerged to account for the aforementioned puzzle: contact theory and contextual theory.

Contact theory posits that any type of proximate contact with racial out-groups is sufficient to trigger powerful psychological and emotional reactions that can result in negative changes in peoples' attitudes and behavior toward those racial out-groups.[8] Such arguments revolve around assumptions about the nature of individual preferences. People have a "natural aversion to heterogeneity" (Alesina and Ferrara 2000) and a "taste for discrimination" (Becker 1957); they derive

[8]Note that this hypothesis is more commonly known as racial/group threat theory. See Blumer (1958), Blalock (1967), and Quillian (1995).

positive utility from interacting with members of their own in-group and negative utility from interacting with members of out-groups (Tajfle et al. 1971; Tajfle 1974; Miller and Brewer 1986; Diehl 1990; Alesina and Ferrara 2000).[9] Members of different groups could also hold divergent preferences over socioeconomic outcomes, such as how public resources should be allocated to benefit the social good (Habyarimana et al. 2007). Whatever the source of differences in individual preferences, the basic premise is that contact with out-groups induces fear of the "other" and zero-sum competition over scarce resources, which in turn increases local levels of intergroup hostility and prejudice (Blalock 1967; Dancygier 2007) and reinforces cooperative strategies that benefit members within in-groups (Grief 1993; LaFerrara 2003). Put differently, racial diversity increases in-group solidarity and out-group exclusion, wrecking social cohesion by exacerbating the divide between "us and them" and reducing trust between racial out-groups (Putnam 2007).[10] Empirically, interracial contact results in lower levels of interpersonal trust and generalized reciprocity (Glaeser et al. 2000), increased negative attitudes toward racial out-groups (Dustmann and Preston 2001), reduced social capital (Putnam 2007), and lower rates of provision of public goods (Alesina, Baqir and Easterly 1999; Miguel and Gugerty 2005; Habyarimana et al. 2007).

By contrast, contextual theory challenges the assumption that "primeval differences" (Lee 2000) between racial groups condemn them to perpetual conflict whenever they meet and interact. It instead argues that the effect of intergroup contact depends crucially on the context under which contact occurs; the contextual setting sets the tone and ground rules for how contact between members of different groups will be interpreted, as well as the utility that people derive from intergroup cooperation.

Intergroup contact can generate positive attitudes toward out-groups when such encounters

[9] Alternatively, people have stronger warm glow(Andreoni 1989) or altruistic preferences toward others who are similar to them. See Banfield (1958) and Bohnet and Frey (1999).

[10] Putnam (2007) also argues that racial diversity causes people to "hunker down" — they not only trust members from racial out-groups less, but also have decreased levels of trust toward members of their own racial in-group.

elicit stereotype-defying information about those out-groups (Allport 1954; Forbes 1997; Jackman and Crane 1986; Pettigrew and Tropp 2006). Such a context is most likely to occur under the following four Allport (1954) conditions: (1) equal status among groups, (2) common goals, (3) a situation that requires intergroup cooperation, and (4) support of local authorities or institutions. Empirically, scholars have found that interracial contact within a school environment — which most closely resembles the Allport conditions — generates positive attitudes and affinity across different racial groups (Laar et al. 2005; Sidanius et al. 2008; Rao 2013). Other types of contextual environments also influence the effect of racial diversity on attitudes and socioeconomic outcomes — for example, the availability of institutions that promote inclusivity (Collier 2000, 2001; Kesler and Bloemraad 2010); the size of the community (Aizlewood and Pendakur 2005; Clark and Kim 2012); neighborhood characteristics (Oliver and Wong 2003; Letki 2008); differences in national cultures (Gesthuizen, van der Meer, and Scheepers 2008, Ivarsflaten and Strmsnes 2013); the availability of a unifying superordinate identity that can facilitate intergroup cooperation, such as national identity (Robinson 2014); and the pace at which the community is diversifying (Hopkins 2009, 2010). The upshot is that racial heterogeneity does not necessarily reduce social cohesion and civic engagement.

1.2.2 Racial Diversification and Socioeconomic Outcomes

We build on both contact theory and contextual theory to explain how racial diversification affects socioeconomic outcomes. Our theory of racial diversification acknowledges that people generally prefer to interact with members of their own racial in-group and that racial groups often possess divergent preferences. However, we question the implicit assumptions that racial identity is the only salient identity for socioeconomic outcomes and that the boundaries of group identities — of which racial groupings are an example — are fixed and unchanging. Identity groupings are social

constructions and their salience and substance varies over time (Huntington 2004).[11] Overall, we argue that intergroup contact (racial heterogeneity) need not always result in increased social conflict, because repeated interactions across groups can foster the development of new, superordinate identities that encompass a more inclusive definition of a common in-group. The rate of racial diversification acts as a foil to the potentially pacifying effects of repeated intergroup contact — rapid racial diversification increases perceptions of racial threat (Blumer 1958) and the salience of racial identity, thereby exacerbating the divide across racial groups and diminishing notions of a shared identity and common future (Horton 1995; Kruse 2005; Lassiter 2006; Hopkins 2009, 2010). Such changes increase animosity across racial groups, lower interpersonal trust, and inhibit interracial cooperation. Consequently, we predict that communities that are rapidly diversifying will experience lower levels of social cohesion and civic engagement.

Repeated intergroup contact could reduce intergroup conflict and promote interracial cooperation in several ways. Members of a minority out-group could gain acceptance into an existing in-group by adopting certain characteristics of that in-group, such as learning their language or embracing their cultural values. Alternatively, people could become used to the idea of co-existing with others from racial out-groups (Enos 2014). Repeated interactions between members of different groups could also result in the creation of a new, all-inclusive superordinate identity. For example, Huntington (2004) documents how American national identity has slowly expanded from one defined solely in terms of race and ethnicity to one defined by shared values such as individualism, personal freedoms, and rule of law. The development of a common in-group identity can reduce intergroup conflict by helping people shift from an "us versus them" mentality to a more encompassing "we" mindset (Kramer and Brewer 1984; Gaertner et al. 1993, 1996; West, Shelton

[11] In our context, salience refers to the importance of racial identity relative to other identities (e.g., nationality, gender), whereas substance refers to the criteria required for membership in an identity grouping (e.g., what does it take for someone to be considered a fellow American?).

and Trial 2009).[12] Indeed, the development of a strong national identity has been effective in facilitating cross-ethnic integration — increased national identification has strengthened interethnic trust and interethnic cooperation (Robinson 2012), increased prosocial giving across inter-ethnic groups (Charnysh, Lucas and Singh 2015) and economic redistribution (Shayo 2009), and reduced the likelihood of interethnic conflict (Sambanis and Shayo 2013).

How does the rate of racial diversification influence socioeconomic outcomes? Consider two previously identical, homogeneous communities that had opened their doors to the same number of immigrants; both communities now have the same level of racial heterogeneity. Community A received immigrants in drips and drabs and diversified gradually, whereas Community B received immigrants en masse and diversified rapidly. Although immigration has altered the racial composition of both communities and introduced new identity groupings into the mix of social interactions, we argue that levels of social cohesion and civic engagement are more likely to be lower in Community B than in Community A. For the reasons elaborated on above, initial intergroup contact will reduce social cohesion and interpersonal trust, but repeated intergroup interactions could promote intergroup cooperation by: (1) producing stereotype-defying information about out-groups, thereby reducing the threat perception of the other (Allport 1954; Pettigrew and Tropp 2006); (2) generating bridging and bonding social capital (Keser and van Winden 2000; Enos 2014); and (3) fostering the development of new, superordinate identities (Kramer and Brewer 1984; Gaertner et al. 1993, 1996; West, Shelton and Trial 2009).

However, the rate of racial diversification acts as a foil to the potentially pacifying effects of repeated intergroup contact. People generally pay less attention to the level of racial heterogeneity than they do the rate of demographic change (Hopkins 2010). This is because the rate of racial diversification affects the likelihood and frequency with which people will come into contact with

[12]Note that the new superordinate identity can co-exist with the previous subordinate identity groupings. For example, Asian Americans and African Americans can retain their cultural identities while sharing a superordinate American national identity. See Dovidio and Gaertner (1999) and Hornsey and Hogg (2000).

a member of a racial out-group within a fixed window of time; a high frequency of initial contact with racial out-groups brings to the forefront of the majority group's collective consciousness that their community is undergoing significant change. These changes increase the salience of racial identities and sharpen the perceived divide across racial groups, creating uncertainty within the community about its shared identity and the viability of a common future, sparking fears about intergroup competition and reducing levels of interpersonal trust (Horton 1995; Sugrue 1996; Self 2003; Kruse 2005; Lassiter 2006; Hopkins 2009, 2010). The development of bridging and bonding social capital across racial groups and the creation of new, shared identities require time; rapid racial diversification undermines this process by chipping away at the slow-forming building blocks of interracial cooperation.

1.3 Singapore as a Case Study

Singapore represents the ideal case study for two reasons: (1) it is a racially heterogeneous country with a rich tradition of multiculturalism that experienced rapid racial diversification between 2000 and 2010; (2) the nature of its planned communities means that racial diversification is keenly felt by local communities, because much of daily life revolves around the immediate neighborhood where people live.

1.3.1 Racial Diversification in Singapore

Like any major city plugged into the global economy, Singapore is cosmopolitan and multicultural, and has historically embraced immigrants with open arms. Its native population — made up mostly of immigrants in the 1800s and 1900s — has traditionally comprised an ethnic Chinese

majority of approximately 70 percent, along with Malay, Indian, and "other" ethnic minorities. [13] Prior to gaining independence in 1965, the different ethnic groups were segregated and resided in ethnic enclaves. In the aftermath of bloody race riots between ethnic Chinese and Muslim Malays in the 1960s, the Singapore government under Prime Minister Lee Kuan Yew implemented several policies designed to foster inter-ethnic cooperation and cohesion among its racially diverse population. These policies included racial quotas for public housing estates to prevent racial clustering and encourage interracial mixing; promotion based on merit rather than race; educational subsidies to facilitate upward social mobility of minorities; official recognition and celebration of important religious and cultural traditions; and expanding of sedition laws to censor hate speech that incite racial conflict. Consequently, Singapore entered into a long period of peaceful co-existence among its different racial groups, with no race riots occurring from 1969 to 2014. The upshot is that Singapore has lived with diversity throughout its entire history and has managed to thrive in spite of it; racial heterogeneity does not always result in increased social conflict.

However, rapid racial diversification in the 2000s has arguably lowered social cohesion and increased intergroup conflict. Beginning in the late 1990s, the Singapore government adopted an open immigration policy as part of its long-term strategy to deal with an aging population and a low fertility rate among its citizens.[14] Singapore's population grew rapidly from 4.3 million in 2000 to 5.1 million in 2010, with 77 percent of that change driven by immigration.[15] The sudden influx of immigrants also drastically altered the demographic composition of Singaporean society and increased perceptions of crowdedness in land scarce Singapore – between 2000 and 2010, the percentage of foreign-born residents rose from 25.9 percent in 2000 to 36.4 percent in 2010, an increase of 40.6 percent; the population density rose by 28 percent to 7,146 persons per square kilo-

[13] http://www.singstat.gov.sg/pubn/popn/population2012b.pdf
[14] See http://population.sg/whitepaper/resource-files/population-white-paper.pdf.
[15] See http://www.singstat.gov.sg/statistics/latest_data.html.

meter.[16] Anecdotal evidence suggests that these changes have resulted in increased cross-cultural clashes and a rise in anti-foreigner sentiment in Singapore. For example, a cursory online search reveals an outpouring of anti-immigrant sentiment on blogs and forums, with words like "foreign trash" becoming increasingly commonly used[17]; seemingly minor incidences have become conflated with debates about foreigners and immigration[18]; Singapore experienced a labor strike by bus drivers from Mainland China and a riot by foreigner workers in its Little India district, the first in several decades.[19] Anti-immigrant sentiment reached its zenith in 2013 after the government released a Population White Paper outlining its plan to admit an additional 1.5 million immigrants by 2030, which would raise the proportion of foreign-born residents to 45 percent. [20] Many Singaporeans took to social media to vent their frustrations[21] and to organize protests[22], and the government has responded to their concerns by reducing the number of foreign worker permits[23] and the rate of population growth.[24]

Overall, the fact that Singapore is a racially heterogeneous country that experienced rapid demographic change makes it an ideal case study for understanding how racial diversification in-

[16]For the 2013 figures on Singapores population density, see http://www.singstat.gov.sg/statistics/latest_data.html.

[17]For example, see http://therealsingapore.com/content/my-experience-foreign-talent-and-foreign-trash and http://www.tremeritus.com/2014/09/13/how-many-more-foreign-trash-are-there-in-nus/.

[18]See for example, what the media has dubbed the "Curry Wars". Singaporeans were incensed after reading in the local newspapers that a newly arrived immigrant family from China had lodged a complaint against a Singaporean-Indian family over the smell emanating from the latters cooking of curry at home. Many Singaporeans took to social media to organize curry cookout sessions to showcase their solidarity with the Singaporean-Indian family, with some demanding that the new immigrant family return to China. See http://www.telegraph.co.uk/news/worldnews/asia/singapore/8704107/Singapores-anti-Chinese-curry-war.html.

[19]To read more about the bus strikes, see http://blogs.wsj.com/searealtime/2013/08/26/the-strike-that-rattled-singapore-a-wsj-investigation/.For more information on the Little India riots, see http://www.gov.sg/government/web/content/govsg/classic/factually/factually-20131213-what-are-the-facts-of-the-rioting-incident-at-little-india-on-8-dec.

[20]http://population.sg/whitepaper/resource-files/population-white-paper.pdf

[21]https://www.facebook.com/overpopulatedsg

[22]https://sg.news.yahoo.com/fury-over-6-9-million-population-target-for-singapore-103503070.html

[23]http://www.mom.gov.sg/foreign-manpower/foreign-worker-levies/Pages/levies-quotas-for-hiring-foreign-workers.aspx

[24]https://sg.news.yahoo.com/singapore-s-population-hits-5-47-million--grows-its-slowest-in-10-years-100102584.html

fluences socioeconomic outcomes. With its multiracial heritage, Singapore's institutions have evolved to promote inclusivity and interracial cooperation, and Singaporeans are accustomed to living amidst racial diversity. These features suggest that Singapore would be better placed to manage racial diversification, relative to many other countries, so our estimates of the effect of racial diversification on socioeconomic outcomes would likely be an underestimate.

1.3.2 Living in Singapore

The nature of Singapores planned communities and its high urban density imply that the effect of racial diversification would be keenly felt by most of its residents. Singapore is one of the most densely populated urban cities in the world, with a population density of 7,540 persons per square kilometer; about 5.4 million people live and work within a land area approximately 3.5 times the size of Washington, DC.[25] The Urban Redevelopment Authority (URA) divides Singapore into 5 geographic *regions*: North, South, East, West, and Central. Each region comprises several *planning areas*; there are 55 planning areas in total. Each planning area can in turn be subdivided into numerous *subzones*. Figures 1.1, 1.2, and 1.3 below illustrates these concepts — for example, Elias Park is a subzone in the Pasir Ris planning area, which is located in the Eastern region of Singapore.

Planning areas are designed to function as self-contained, satellite communities that comprise public housing units, shopping malls, a town center, and communal facilities. For example, the typical planning area contains a community center, public parks, schools, places of worship, restaurants, supermarkets, retail outlets, pet stores, and movie theatres. Each subzone also has its own local grocery stores, kindergartens, outpatient clinics, elderly care facilities, playgrounds, and green spaces. The upshot is that most Singaporeans can go about their daily lives within the confines of

[25] https://sg.news.yahoo.com/singapore-s-population-hits-5-47-million--grows-its-slowest-in-10-years-100102584.html

Figure 1.1: *Planned Communities: East Region*

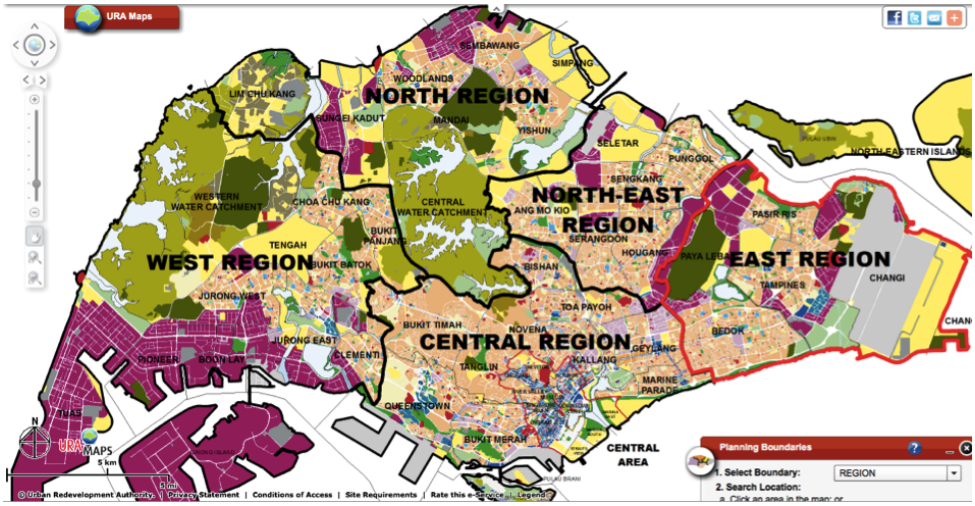


Figure 1.2: *Planned Communities: Pasir Ris Planning Area*

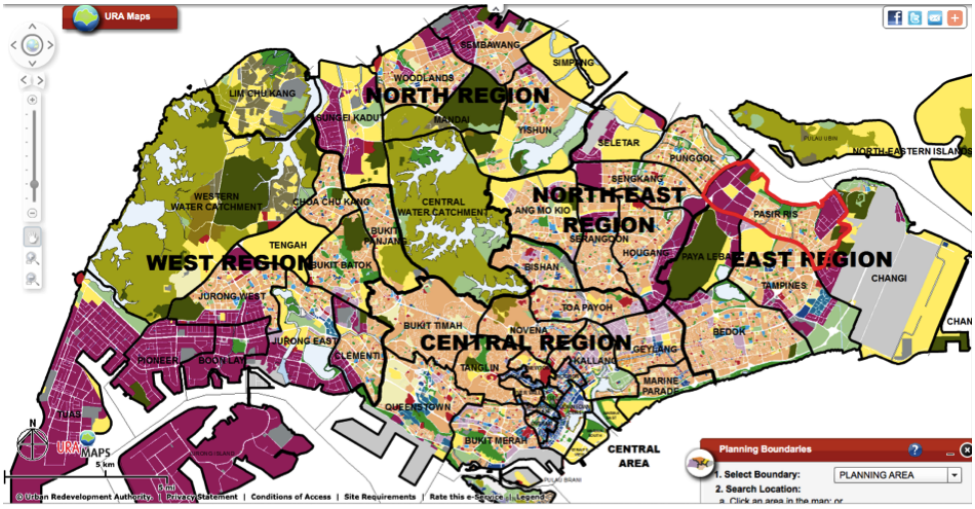
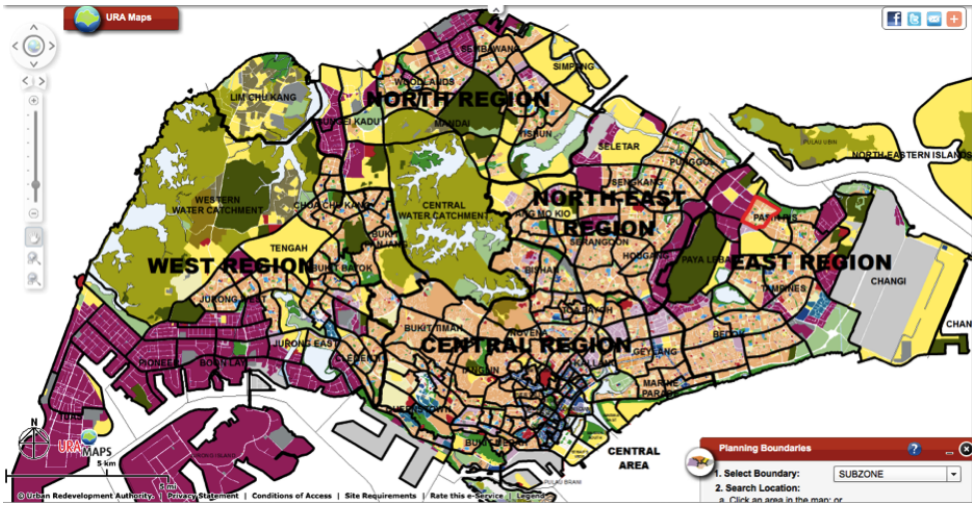


Figure 1.3: *Planned Communities: Elias Park Subzone*



their planning area of residence, traveling to the city center or other parts of the island to work or play. Consequently, they will not only be highly attuned to a sudden influx of racial out-groups in their planning area, but also be compelled by geospatial proximity to interact with them. These features closely mirror the scope conditions outlined by our theory in Section 2 — awareness about demographic changes increases the salience of racial identities, deepening the perceived divide across racial groups.

1.4 Data and Identification Strategy

This section motivates the research design, which seeks to evaluate whether rapid racial diversification between 2000 and 2010 subsequently reduced social cohesion and civic engagement in Singapore, which we measure using data on self-reported volunteering behavior. Ideally, we would have designed an experiment that randomly introduced varying rates of racial diversification into residential neighborhoods and compared socioeconomic outcomes thereafter. However, given the

infeasibility of such a design in the real world, we opted for an observational study that combined survey data on volunteering behavior with census data on racial demographic changes. We begin with an overview of the data and define the key variables of interest. We then discuss the issue of non-random selection into residential neighborhoods and outline our empirical strategy for estimating the effect of racial diversification on volunteering behavior.

1.4.1 Overview of Data

We construct a novel dataset that combines individual-level survey data from the 2012 Individual Giving Survey (IGS) — a nationally representative survey on volunteering and giving behavior — with planning area-level census data on racial demographics from 2000 and 2010.[26] We consider the planning area as the relevant residential neighborhood for each respondent, for the reasons described in Section 3.2 above. The dataset contains 1,512 observations and includes a range of control variables that might influence volunteering, which we group into three broad categories: (1) Individual characteristics; (2) Attitudes toward giving; and (3) Contextual environment characteristics.[27] Table 1.1 below summarizes.

Volunteering refers to activities undertaken freely to help others outside ones household, family, or relatives, without any expectation of financial compensation (NVPC 2012). We further distinguish between two forms of volunteering: formal and informal. Formal volunteering refers to volunteering activity that occurs through participation in an organization, whereas informal volunteering refers to volunteering activity that occurs individually outside an organizational context, such as helping ones neighbors. We construct three binary dependent variables to indicate the type of volunteer activity that the respondent undertook in 2012: volunteering, formal volunteering, and

[26]We thank the National Volunteer and Philanthropy Centre (NVPC) for providing us access to their IGS 2012 survey data. For more information on the IGS 2012 survey, see http://www.nvpc.org.sg.

[27]See Wilson (2000), Wilson and Musick (1997) and Wilson (2012) for excellent overviews on why people volunteer.

Table 1.1: *Summary of Variables from the Dataset*

	Variable	Description
Dependent Variable	Formal Volunteering	Binary variable, coded 1 if respondent engaged in formal volunteering in the past 12 months, 0 otherwise
	Informal Volunteering	Binary variable, coded 1 if respondent engaged in informal volunteering in the past 12 months, 0 otherwise
Key Independent Variable	Racial Diversification	Continuous variable, change in the proportion of other racial groups, within a planning area, between 2010 and 2000
	Racial Diversification Treatment	Binary variable, coded 1 if racial diversification is greater than or equal to the mean level of racial diversification , 0 otherwise
Individual Characteristics	Age	Categorical variable, self-reported age
	15 to 19 Years Old	Binary variable, coded 1 if respondent is between 15 and 19 years of age, 0 otherwise
	20 to 24 Years Old	Binary variable, coded 1 if respondent is between 20 and 24 years of age, 0 otherwise
	25 to 34 Years Old	Binary variable, coded 1 if respondent is between 25 and 34 years of age, 0 otherwise
	35 to 59 Years Old	Binary variable, coded 1 if respondent is between 35 and 59 years of age, 0 otherwise
	60 Years Old and Above	Binary variable, coded 1 if respondent is 60 years of age and above, 0 otherwise
	Male	Binary variable, coded 1 for males, 0 otherwise
	Chinese	Binary variable, coded 1 for Chinese, 0 otherwise
	Indian	Binary variable, coded 1 for Indian, 0 otherwise
	Malay	Binary variable, coded 1 for Malay, 0 otherwise
	Other	Binary variable, coded 1 for Other races, 0 otherwise
	Tertiary	Binary variable, coded 1 for tertiary education or above, 0 otherwise
	Employed	Binary variable, coded 1 if respondent is employed, 0 otherwise
	Married	Binary variable, coded 1 for married, 0 otherwise
	Citizen	Binary variable, coded 1 for citizens, 0 otherwise
	Religious	Binary variable, coded 1 if respondent practices a religion, 0 otherwise
	Income	Categorical variable, self-reported income bracket
Attitudes Toward Giving	Self-help	Binary variable, coded 1 if respondent answered "Agree" and "Strong Agree" to the statement "I need to do more to help others or the community", 0 otherwise
	Government-help	Binary variable, coded 1 if respondent answered "Agree" and "Strong Agree" to the statement "Government needs to do more to help others or the community", 0 otherwise
	Donate	Binary variable, coded 1 if respondent donated in the past 12 months, 0 otherwise
Contextual Environment	Population Growth	Continuous variable, change in the population, within a planning area, between 2010 and 2000
	HDB	Binary variable, coded 1 if respondent lives in a HDB flat, 0 otherwise
	Condo	Binary variable, coded 1 if respondent lives in a private condo, 0 otherwise
	Landed	Binary variable, coded 1 if respondent lives in a landed house, 0 otherwise
Geographic Region	Region 1	Binary variable, coded 1 if North-East Region, 0 otherwise
	Region 2	Binary variable, coded 1 if Central Region, 0 otherwise
	Region 3	Binary variable, coded 1 if East Region, 0 otherwise
	Region 4	Binary variable, coded 1 if North Region, 0 otherwise
	Region 5	Binary variable, coded 1 if West Region, 0 otherwise

informal volunteering. Overall, 501 of the 1,512 respondents, or about 33 percent, volunteered in 2012. Of these 501 volunteers, 230 (46 percent) volunteered formally through organizations and 271 (54 percent) volunteered informally.

The key explanatory variable is racial diversification, which we define as the percentage change in the proportion of racial out-groups within a planning area, between 2000 and 2010. The Singapore census data categorizes four racial groups — Chinese, Malay, Indian, and Others — so each planning area contains four racial diversification scores to measure the different localized experiences for each racial group. Note that our definition of racial diversification implies that two individuals of different races who live in the same neighborhood will perceive of demographic changes in their neighborhood differently. For illustration, consider a neighborhood comprised of 75 percent Chinese and 25 percent Indian residents in the year 2000. Immigration alters the racial composition of this neighborhood, such that the racial demographics in 2010 are now 70 percent Chinese and 30 percent Indian. The Chinese resident experiences an increase in the proportion of Indians in his neighborhood between 2000 and 2010; his racial diversification score is 20 percent.[28] By contrast, the Indian resident experiences a decrease in the proportion of Chinese in his neighborhood between 2000 and 2010; his racial diversification score is negative 6.7 percent. This accords with our theory of racial diversification outlined in Section 2, where we argued that racial diversification increases the salience of racial identities and deepens the perceived divide across racial groups. Racial diversification ranged from -7.6 percent to 71.7 percent, with a mean of 8.6 percent and a standard deviation of 8.8 percent. Overall, neighborhoods were diversifying rapidly, with the average person experiencing a greater influx of racial out-groups in a span of 10 years.

[28]Racial diversification from the Chinese residents perspective is 100 X (Proportion of Indians in 2010 Proportion of Indians in 2000)/ Proportion of Indians in 2000.

1.4.2 Nonrandom Selection into Residential Neighborhoods

Next, we address potential concerns about self-selection into residential neighborhoods, which could yield biased estimates of the effect of racial diversification on volunteering behavior. Though people choose which neighborhood to live in, they generally have less choice in selecting the broader contextual environment that their neighborhood is situated in, in part because of employment or family reasons (Dustmann and Preston 2001). We suggest that this is indeed the case for Singapore, where the unique combination of a computerized balloting process for new public housing units and ethnic quotas for public housing apartment blocks and neighborhoods result in a greater degree of self-selection into subzones relative to planning areas. Note that planning areas include a mix of public housing, private apartments, and landed houses. Since the vast majority of Singaporeans live in government-built apartment buildings, we focus on self-selection into public housing estates, since the resulting racial composition in those locations will approximately reflect the overall racial composition in the aggregated planning areas.

We argue that racial diversification at the planning area level can serve as an exogenous instrument for racial diversification at the subzone level (Dustmann and Preston 2001) —- the measures are highly correlated because planning area racial diversification is an aggregate of subzone racial diversification; moreover, self-selection occurs at the subzone level rather than the planning area. We begin with an overview of public housing in Singapore and how they relate to the URA's planned communities outlined in Section 3.2. Next, we explain how ethnic quotas affect racial demographics within residential neighborhoods. We then describe the process of balloting for a new flat from the HDB and how that reinforces self-selection into subzones rather than planning areas.

Approximately 82 percent of Singaporeans live in public housing — multi-story apartment blocks built by the governments Housing Development Board (HDB).[29] Each HDB block comprises an average of 74 households; 45 HDB blocks make up an average HDB neighborhood and several clusters of HDB neighborhoods make up a HDB town (Wong 2013).[30] Figure 1.4 below illustrates these concepts. The map presents two partial HDB neighborhoods within the HDB's Tampines New Town. HDB blocks are colored red and communal facilities are colored grey. In general, Neighborhood *X* comprises all HDB blocks numbered from "*X*"00 to "*X*"99, where *X* is between 1 to 9. In Fig 1.4, Neighborhood 1 comprises all HDB blocks numbered from 100 to 199, whereas neighborhood 2 comprises all HDB blocks numbered from 200 to 299, and so on. Note that HDB towns are part of a URA planning area, whereas HDB neighborhoods are part of a URA subzone. We refer to these concepts interchangeably for the rest of the paper.

The Singapore government implemented the Ethnic Integration Policy (EIP) in 1989 to ensure a "balanced ethnic mix across HDB estates and to prevent the formation of racial enclaves".[31] The EIP sought to promote racial integration by mandating uniform upper limits on the proportion of racial groups within all HDB blocks and HDB neighborhoods. These quotas reflect Singapore's demographic composition but allow for some variation. For example, in 2010, the ethnic quota for HDB blocks was 25% for Malays, 87% for Chinese, and 15% for Indians and Others, whereas the ethnic quota for HDB neighborhoods was 22% for Malays, 84% for Chinese, and 12% for Indians and Others. Comparatively, Singapore comprised 13.4% Malays, 74.1% Chinese, and 12.5% Indians and Others. See Table 1.2 below. Importantly, these quotas applied only to first-time purchases of new flats from the HDB or the purchase of flats on the resale market that were made after 1989. Real estate transactions in the public housing market were only allowed to proceed if

[29] See Board (2013).

[30] The high population density means that each HDB neighborhood is comparable to a US Census tract by population size (Wong 2013).

[31] http://www.hdb.gov.sg/fi10/fi10296p.nsf/PressReleases/C515273FA068DD58482576DD00169155?OpenDocument.

Figure 1.4: *Geospatial Overview of Tampines New Town*

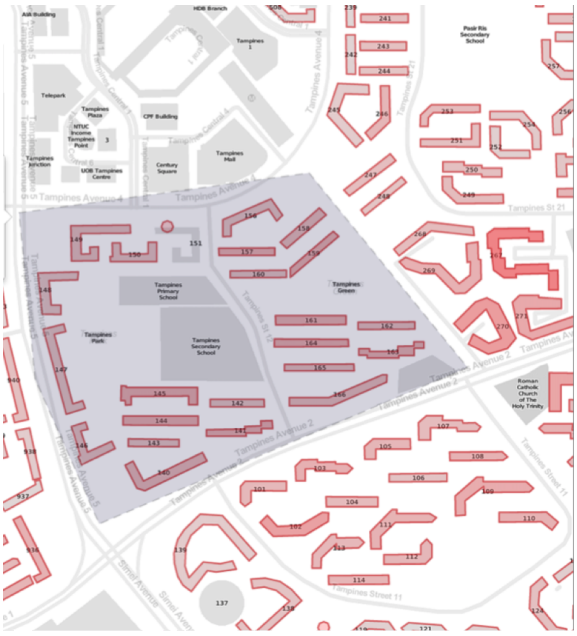


Table 1.2: *2010 Ethnic Quotas in HDB Neighborhoods and Blocks*

Ethnic Group	Neighbhorhood Quota (%)	Block Quota (%)	Population Demographics (%)
Chinese	84	87	74
Malay	22	25	13
Indian/Others	12	15	13

they did not result in the HDB block or HDB neighborhood exceeding the mandated ethnic quota.

The computerized process for new flats reinforces selection at the level of the HDB block and neighborhood (URA subzone), and not the HDB town (URA planning area). When first-time buyers wish to purchase a new HDB flat from the government, they submit a ballot to the HDB. Their success at the ballot depends on the characteristics of the applicant — for example, first-time buyers and married couples with children have a higher probability of winning the ballot. Ballot winners are invited to purchase new flats from among the various HDB blocks that happen to be put up for sale. The process is as follows. First, ballot winners select a flat type — for example, 2-room,

3-room, or 4-room — within a particular HDB neighborhood (see Figure 1.5). Next, they select the HDB block within the neighborhood (see Figure 1.6). Note that the ethnic quotas for HDB neighborhood and HDB block are displayed at each part of the process. Applicants will not be allowed to purchase a flat if the quota for their racial group has been met. This process reinforces conscious selection at the subzone level because people first select into the HDB neighborhood before selecting their HDB block.

Figure 1.5: *Selecting a HDB Neighborhood for First-Time Buyers*

Flats Available for Selection (For Invited Applicants)

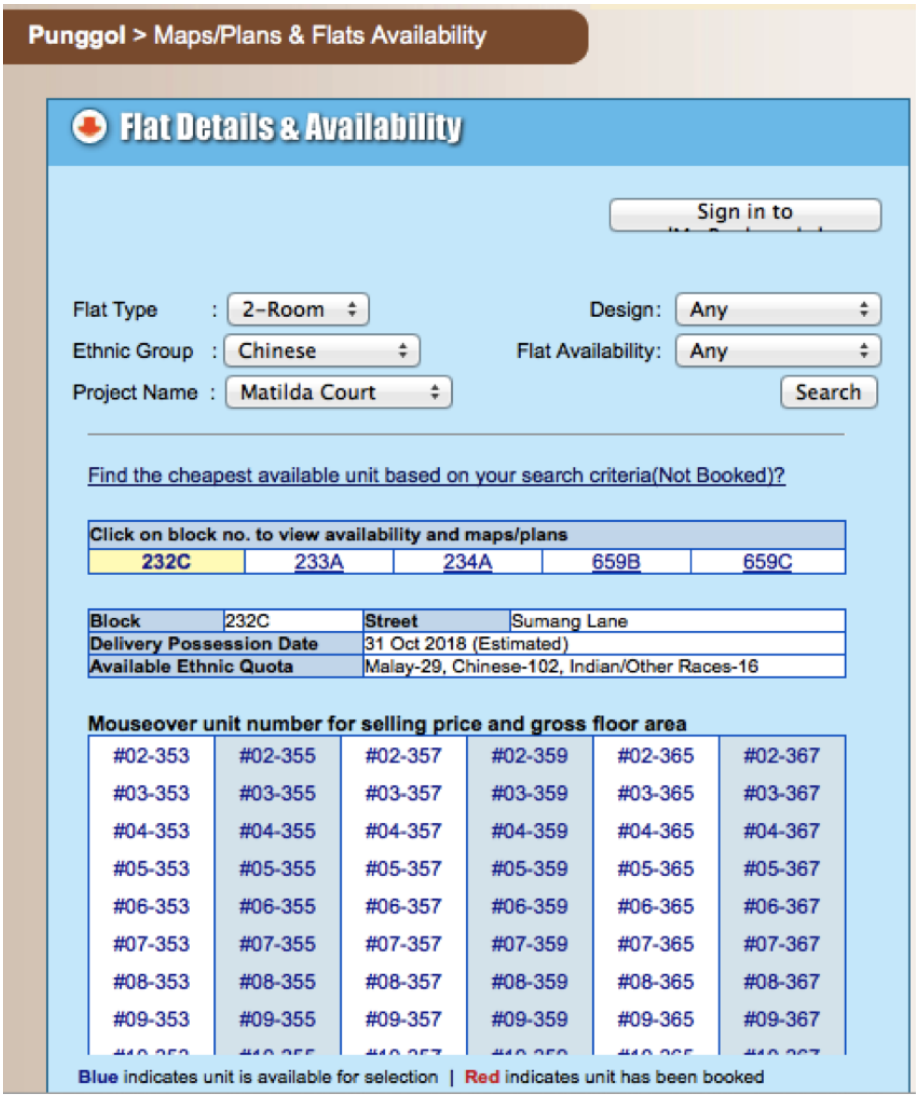
Email | Print | PDF | Share

Selection Exercise

Mode of Sale: Build-To-Order | Sale of Balance Flats

Build-To-Order	Flat Type (Click on flat type below to view maps, plans and unit availability)	Units Offered	Units Available for Selection	Available Ethnic Quota**		
				Malay	Chinese	Indian & Other Races
Jul 2014						
Punggol						
Matilda Court & Waterway Sunray	2-Room	424	359	86	304	49
	3-Room	208	178	35	157	25
	4-Room	574	531	124	453	70
	5-Room	538	503	118	425	65
Sembawang						
Sun Natura	2-Room	330	303	65	261	37
	3-Room	121	105	22	91	13
	4-Room	397	365	74	321	45
Toa Payoh						
Toa Payoh Apex	3-Room	138	91	28	74	13
	4-Room	419	313	92	256	45

Figure 1.6: *Selecting a HDB Block for First-Time Buyers*



Overall, the quotas effectively place an upper bound on the level of racial heterogeneity within HDB blocks and neighborhoods in the long run. However, racial diversification can still take place in the short run because of the initial variation in racial heterogeneity across HDB blocks and neighborhoods prior to 1989 — residential areas that were previously more homogeneous are becoming more diverse. Immigration increases racial diversification at the planning area level because the new immigrants self-select into HDB blocks and neighborhoods, albeit subject to a broad set of ethnic quotas, thereby changing the demographic composition within planning areas.

1.4.3 Empirical Strategy

We seek to evaluate the effect of racial diversification on formal volunteering and informal volunteering. For each evaluation, we first present the results from a logistic regression with regional dummies and standard errors clustered by planning area-racial group. We then include controls for the respondents individual characteristics and attitudes toward giving. Next, we include controls for the contextual environment. Our preferred model is the most conservative: the logistic regression with regional dummies, clustered standard errors, and all controls included. To interpret the racial diversification coefficient from the logistic regressions, we use the $CLARIFY$ software in $STATA$ (King, Tomz and Wittenberg 2000). We set the values of all control variables to their means and examine the change in predicted values of the dependent variable when racial diversification increases from 0 to the mean level of racial diversification.

1.5 Findings

In this section, we present the empirical findings. We begin with the findings for the effect of racial diversification on formal and informal volunteering behavior. Next, we delve into a short

discussion on the control variables. We then implement several robustness checks: dropping racial diversification outliers and implementing multilevel logistic regressions to account for the hierarchical nature of the sampled data.

1.5.1 Did Racial Diversification Reduce Formal and Informal Volunteering?

Tables 1.3 and 1.4 respectively present the results from the various logistic regressions on formal and informal volunteering behavior. Overall, racial diversification lowered respondents propensity to engage in informal volunteering but had no effect on their formal volunteering behavior — racial diversification is negative and statistically significant for the informal volunteering analyses and negative but statistically insignificant for the formal volunteering analyses. Setting the values of all control variables to their means, we simulate that a person living in an average neighborhood that underwent racial diversification was 20.5 percent less likely to engage in informal volunteering, compared to a person living in a demographically static neighborhood. Interestingly, racial heterogeneity had no effect formal volunteering or informal volunteering.[32] Note that this is in accordance with our theoretical arguments in Section 2 about how racial diversification, rather than racial diversity, influences social cohesion and civic engagement.

[32]Result available upon request.

Table 1.3: *The Effect of Racial Diversification on the Likelihood of Formal Volunteering*

	(1)	(2)	(3)	(4)
Racial Diversification	-0.001	-0.004	-0.005	-0.005
Age		-0.191***	-0.184***	-0.185***
Male		0.115	0.113	0.105
Chinese		(omitted)	(omitted)	(omitted)
Malay		-0.134	-0.187	-0.141
Indian		-0.054	-0.134	-0.074
Other		0.177	0.143	0.145
Tertiary		0.204	0.199	0.139
Employed		-0.569**	-0.542**	-0.438*
Married		0.298*	0.271	0.270
Citizen		0.516**	0.521**	0.559**
Religious		0.235	0.209	0.213
Income		0.082**	0.070*	0.05
Self-help				0.500***
Government-help				-0.441
Donate				0.402
Population Growth				0.001
HDB				-0.622
Condo				-0.231
Landed				(ommited)
Number of Observations	1473	1409	1409	1409
Number of Clusters	101	101	101	101
Regional Fixed Effects	Yes	Yes	Yes	Yes
Pseudo-R2	0.0011	0.0657	0.0751	0.0787

Notes: *** indicates statistical significance at the 0.01 level, ** at the 0.05 level, and * at the 0.10 level.

Table 1.4: *The Effect of Racial Diversification on the Likelihood of Informal Volunteering*

	(1)	(2)	(3)	(4)
Racial Diversification	-0.025***	-0.032*	-0.035**	-0.034**
Age		-0.067**	-0.053*	-0.042
Male		-0.253*	-0.228*	-0.254*
Chinese		(omitted)	(omitted)	(omitted)
Malay		0.002	-0.075	-0.028
Indian		-0.355	-0.462	-0.505
Other		-0.829*	-0.864**	-0.865**
Tertiary		0.107	0.102	0.118
Employed		-0.047	-0.087	-0.126
Married		0.464***	0.401**	0.360**
Citizen		-0.014	-0.072	-0.083
Religious		0.376	0.320*	0.29
Income		-0.001	-0.01	0.000
Self-help			0.400***	0.392**
Government-help			-0.017	-0.067
Donate			1.300***	1.290***
Population Growth				0.009***
HDB				1.134*
Condo				1.044
Landed				(ommited)
Number of Observations	1473	1409	1409	1409
Number of Clusters	101	101	101	101
Regional Fixed Effects	Yes	Yes	Yes	Yes
Pseudo-R2	0.0196	0.0382	0.0548	0.0723

Notes: *** indicates statistical significance at the 0.01 level, ** at the 0.05 level, and * at the 0.10 level.

1.5.2 The Control Variables

We had included a range of controls that might influence formal and informal volunteering, which we had grouped into three broad categories: (1) Individual characteristics; (2) Attitudes toward giving; and (3) Contextual environment characteristics. Table 1.5 below lists these controls and notes their effect on both formal and informal volunteering.

Those who believed that they needed to "do more to help others or the community" were more likely to volunteer formally and informally (see the Self-help variable in Table 1.5). This finding does not surprise, as we would expect people who hold such beliefs to possess more altruistic preferences and prosocial tendencies.

Individual-level characteristics such as age, employment status, and citizenship status influenced formal volunteering but not informal volunteering. Specifically, older respondents and those who were employed in either a full-time or a part-time job were less likely to volunteer formally; citizens were more likely to engage in formal volunteering activities.

The relationship between age and employment status is in line with previous research that the lack of time explained why people did not volunteer in formal organizations (NVPC 2012). People generally take on greater personal and work commitments as they grow older, which in turn reduces the amount of time they have to volunteer (Wilson 2000). For example, those in their early thirties need to spend time raising their children and developing in their careers and therefore have less time to volunteer. Similarly, people who are employed have less time to engage in volunteering activities. Time constraints are more binding when applied to formal rather than informal volunteer, as the former requires greater and more sustained time commitment than the latter. This explains why age predicts formal volunteering but not informal volunteering activity.

The finding that citizens are more likely to engage in formal volunteering behavior accords with research on social capital and social ties. Citizens generally have stronger ties to their local

Table 1.5: *Comparison of the Predictors of Formal and Informal Volunteering*

	Formal Volunteering	Informal Volunteering
Racial Diversification	No effect	-
Age	-	No effect
Male	No effect	-
Chinese	(ommited)	(ommited)
Malay	No effect	No effect
Indian	No effect	No effect
Other	No effect	-
Tertiary	No effect	No effect
Employed	-	No effect
Married	No effect	+
Citizen	+	No effect
Religious	No effect	No effect
Income	No effect	No effect
Self-help	+	+
Government-help	No effect	No effect
Donate	No effect	+
Population Growth	No effect	+
HDB	No effect	+
Condo	No effect	No effect
Landed	(ommited)	(omitted)

community relative to non-citizens. Formal volunteering encompasses a range of activities that include voluntary provision of public goods, whereas informal volunteering is limited solely to the provision of personal help to another person. We therefore expect citizens to be more likely than non-citizens to volunteer formally.

By contrast, gender, race, marital status, previous history of donating, population growth of the local community, and housing type explained informal volunteering behavior but not formal behavior. Specifically, men and those from the "Other" racial group were less likely to volunteer informally; those who were married, donated in the past 12 months, resided in planning areas that were experiencing high population growth rates between 2000 and 2010, and lived in densely populated housing types such as HDB blocks were more likely to volunteer informally.

The findings on gender, racial group, and previous donating behavior have precedent in previous research. Women are more likely than men to volunteer informally because they have been socialized to be more nurturing. Informal volunteering encompasses activities that fit into a female gender role (Gallagher 1994), whereas formal volunteering spans a wide variety of activities, not all of which fit into clearly defined gender roles (Wilson 2000). Unobserved cultural attributes that are specific to particular racial groups could also influence patterns of volunteering behavior. For example, blacks are more likely to volunteer informally because they lack the resources to engage in formal volunteering work (Gallagher 1994). The findings suggest that members of the "Other" racial group are less likely to volunteer informally, but do not explain why. Finally, those who donated in the past 12 months are likely to be more prosocial in general and therefore more likely to engage in informal volunteering, which is more purely about helping others compared to formal volunteering — people volunteer formally for numerous reasons that might be independent of helping others, such as acquiring a new skill, improving their resume, or strengthening their social network; people who volunteer informally generally do so to help people.

Finally, the findings on population growth and housing type relate to the contextual environment that respondents live in, particularly the population density of the surrounding area. In general, the higher the population density, the more interactions people will have with others on a daily basis, and therefore the more opportunities for informal volunteering. It therefore makes sense that those who live in planning areas that experienced high population growth were more likely to volunteer informally. Similarly, we would also expect those who live in high-density HDB blocks to engage in informal volunteering more frequently than those who live in landed houses (the omitted group).

1.5.3 Robustness Checks

Next, we evaluate whether our findings are robust to the exclusion of outliers and multilevel logistic regression models that account for the hierarchical nature of the sampling method used to generate the data.

First, most people in Singapore experienced moderate levels of racial diversification between 2000 and 2010 — the mean racial diversification was 8.1 percent, with a standard deviation of 8.6 percent. However, the distribution of racial diversification suggests that some racial groups experienced extreme levels of racial diversification — for example, Chinese living in the Tanglin planning area experienced a 72 percent increase in the proportion of other racial groups.

To evaluate whether the inclusion of these outliers influenced the results from the earlier analyses, we trim the outliers from our data and rerun our analyses on the trimmed sample. For the purposes of this robustness check, we implement the most conservative logistic regression model with all control variables included (see Tables 1.4 and 1.5, column 4). Table 1.6 below summarizes the results from these analyses. Columns 1 and 2 present the results when we trim the top and bottom 5 percent of the sample; columns 3 and 4 present the results when we trim the top and

bottom 10 percent of the sample. Overall, our findings are robust to the exclusion of outliers — racial diversification lowered the propensity to engage in informal volunteering behavior but did not influence the formal volunteering behavior.

Second, our data has a hierarchical structure, since it comprises observations that were obtained through a two-stage sampling process — households were randomly sampled from planning areas and people were randomly sampled from households. Moreover, our analyses involve examining how contextual variables at the planning area level (racial diversification) influenced decisions to volunteer at the individuals level. Traditional logistic regressions do not account for these hierarchical relationships and instead treat each observation in our dataset as independent; they lead to underestimates in the standard errors for the regression coefficients, thereby increasing the likelihood of identifying significant effects when none exist (Gelman 2006; Gelman and Hill 2007; Hox 2010).[33] Multilevel models account for the hierarchies in the data by allowing for residual components at each level in the hierarchy. For our data, this means partitioning the residual variance of the logistic regression model into a between component (variance of the racial groupplanning area residuals) and a within component (variance of the household level residuals).

Table 1.7 below presents the results from a two-level random intercepts logistic regression, with levels fixed at the racial groupplanning area level and the household level.[34] Column 1 presents the results with formal volunteering as the dependent variable and Column 2 presents the results with informal volunteering as the dependent variable. We obtain the same findings as our initial analyses in Section 1.5.1 — racial diversification lowered the propensity to engage in informal volunteering.

[33]The University of Bristols Centre for Multilevel Modelling provides an excellent online resource for multilevel models. See http://www.bristol.ac.uk/cmm/learning/multilevel-models/what-why.html.

[34]See Laurence (2011) for an example of research that use multilevel modeling.

Table 1.6: *Robustness Check: Excluding Outliers from the Analyses*

	Trim 5%, Formal Volunteering	Trim 5%, Informal Volunteering	Trim 10%, Formal Volunteering	Trim 10% Informal Volunteering
	(1)	**(2)**	**(3)**	**(4)**
Racial Diversification	0.004	-0.058**	0.02	-0.062*
Age	-0.193***	-0.036	-0.231***	-0.037
Male	0.121	-0.264*	0.005	-0.226*
Chinese	(omitted)	(omitted)	(omitted)	(omitted)
Malay	-0.111	-0.201	0.025	-0.226
Indian	-0.251	-0.769**	-0.213	-0.873*
Other	0.139	-1.500***	0.520	-0.790*
Tertiary	0.167	0.185	0.185	0.212
Employed	-0.605**	-0.027	-0.692**	-0.065
Married	0.226	0.338**	0.220	0.366*
Citizen	0.425*	-0.004	0.483*	-0.005
Religious	0.269	0.26	0.185	0.289
Income	0.084*	0.000	0.07	0.004
Self-help	0.408**	0.443**	0.382*	0.501***
Government-help	-0.363	-0.327	-0.422	-0.359
Donate	0.607*	1.285***	0.622*	1.250***
Population Growth	0.002	0.076***	0.002	0.008***
HDB	-0.777	1.851**	-0.794	1.882**
Condo	-0.508	1.649*	-0.385	1.766*
Landed	(omitted)	(omitted)	(omitted)	(ommited)
Number of Observations	1257	1257	1113	1113
Number of Clusters	83	83	69	69
Regional Fixed Effects	Yes	Yes	Yes	Yes
Pseudo-R2	0.0875	0.0790	0.1104	0.0789

Notes: *** indicates statistical significance at the 0.01 level, ** at the 0.05 level, and * at the 0.10 level.

Table 1.7: *Robustness Check: Robustness Check: Multilevel Logistic Regressions*

	Formal Volunteering (1)	Informal Volunteering (2)
Racial Diversification	-0.004	-0.034**
Age	-0.204***	-0.041
Male	0.123	-0.260*
Chinese	(omitted)	(omitted)
Malay	-0.150	-0.036
Indian	-0.038	-0.505*
Other	0.149	-0.859**
Tertiary	0.168	0.116
Employed	-0.468*	-0.123
Married	0.296	0.365**
Citizen	0.620**	-0.090
Religious	0.253	0.290
Income	0.053	-0.002
Self-help	0.550**	0.392**
Government-help	-0.527	-0.065
Donate	0.452	1.291***
Population Growth	0.001	0.008***
HDB	-0.693	1.133
Condo	-0.253	1.031
Landed	(omitted)	(omitted)
Number of Observations	1409	1409
Number of Racial group-Planning Area Clusters	101	101
Number of Household Clusters	1294	1294
Wald Chi-Square	50.43	74.88

Notes: *** indicates statistical significance at the 0.01 level, ** at the 0.05 level, and * at the 0.10 level.

1.6 Conclusion

Overall, we find that racial diversification reduced the likelihood of informal volunteering but not formal volunteering; racial heterogeneity had no effect on volunteering behavior. How should we interpret these findings?

Though we do not directly test for the mechanisms through which racial diversification lowers the likelihood of informal but not formal volunteering, we speculate that interpersonal trust plays a significant role, in line with previous research that finds that racially heterogeneous communities have lower levels of trust (Glaeser et al. 2000; Costa and Kahn 2003; Anderson and Paskeviciute 2006; Putnam 2007). Informal volunteering generally involves spontaneous helping of others within ones immediate environment; it is intensely personal and targeted in nature, requiring a high degree of direct interaction between the volunteer and recipient. By contrast, formal volunteering encompasses planned activities that include interpersonal giving (e.g., reading to underprivileged children), promoting a cause (e.g., raising awareness on environmental protection), and contributing to the public good (e.g., cleaning litter in ones neighborhood). It is less personal and more diffuse than informal volunteering as volunteers need not interact directly with recipients.

When neighborhoods diversify, racial identities become more salient, sharpening the perceived divide across racial groups. Intergroup contact sparks fears of intergroup competition and lowers interpersonal trust, which in turn reduces the natural affinity that neighbors have for one another. People volunteer informally primarily because they feel a sense of affinity with the recipient and are compelled by circumstance to help; the diminished interpersonal trust that comes with racial diversification therefore lowers the likelihood of informal volunteering because it removes a core source of motivation for doing so. Formal volunteering remains unaffected by neighborhood racial diversification because people engage in such activities for a variety of reasons that extend beyond interpersonal helping, such as enhancing their resume and making new friends.

In conclusion, our study extends the main findings from Alesina and Ferrara (2000), Costa and Kahn (2003), and Putnam (2007), using a new set of data on volunteering behavior in a non-Western context. We find that racial heterogeneity reduces social cohesion and civic engagement, but only in communities that are undergoing rapid demographic change. Because we focus on residents living in Singapore, a country with a rich tradition of multiculturalism and immigration, the effect of racial diversification might be even greater in countries with weaker institutions for promoting inclusivity and interracial cooperation. The negligible effect that racial diversification had on formal volunteering, however, gives some cause for hope. People engage in formal volunteering for various reasons, so it remains possible that bonding social capital forged from prior social interactions that were facilitated by volunteer work could help communities withstand the deleterious effects of racial diversification. This appears to be the case for Singapore, where racial diversification had no effect on formal volunteering activities that revolved somewhat around shared identities and social causes — rather than direct interpersonal helping la informal volunteering — such as sitting on professional boards, campaigning for the environment, and preserving heritage. Indeed, recent research demonstrates that shared identities and common understandings that emerge from repeated intergroup contact could serve as rallying points for inter-ethnic cooperation (Charnysh, Lucas and Singh 2015). Racial heterogeneity does not condemn communities to perpetual conflict; policymakers should therefore focus their efforts on integrating immigrants, rather than excluding them.

Chapter 2

Micro-Targeting Appeals to Encourage Prosocial Behavior: Evidence from a Field Experiment on Volunteering

Can micro-targeted appeals — messages that are tailored to match the characteristics of subgroups within a target population — improve the effectiveness of volunteer outreach campaigns in recruiting volunteers? We used data from a field experiment in Singapore to examine which combination of *contextual information* and *motivational frames* increased actual volunteering behavior among current volunteers, former volunteers, and non-volunteers. Contextual information refers to background information about childhood poverty in Singapore. Motivational frames refer to messages that emphasize the altruistic, impure altruistic, self-image, and self-interest aspects of volunteering. Overall, current volunteers and former volunteers were 33 percent more likely to express

interest in volunteering, compared to non-volunteers. However, among those interested in volunteering, volunteer status had no effect on whether they actually volunteered. We also find that information about childhood poverty had no effect on volunteering behavior. By contrast, the effect of motivational frames varied across the subgroups. The mere opportunity to volunteer appeared sufficient to nudge current volunteers to volunteer — motivational frames had no effect on their actual volunteering behavior. Impure altruism motivational frames were most effective in nudging former volunteers to volunteer again, whereas altruism motivational frames were most effective in nudging non-volunteers to begin volunteering for the first time.

2.1 Introduction

Every year, nonprofits and social welfare organizations depend on the generosity of millions of unpaid volunteers to implement their programs and effect social change. Volunteers contribute their time toward numerous causes, such as collecting and distributing food to the homeless and poor, raising awareness on environmental and gender equality issues, tutoring underprivileged children, and providing companionship to the elderly. Overall, volunteers generate significant economic and social value for their communities; 64.5 million volunteers in the United States contributed an estimated $175 billion worth of services in 2012.[1]

To remain viable, voluntary organizations need to continuously nurture and expand their volunteer base. They do so through volunteer outreach campaigns, which encompass both passive advertising on broadcast and print media and direct engagement with the public through face-to-face appeals. Besides providing information on pressing social issues and volunteering opportunities, the ultimate aim of such efforts is to encourage people to volunteer. The specific content of appeals and the media through which they are delivered may influence their effectiveness in shaping

[1] See http://www.volunteeringinamerica.gov/national for more information.

behaviors in the desired fashion. Yet little rigorous research has been undertaken to directly assess the efficacy of volunteer outreach campaigns, or to examine how they could be optimally designed. Academics have generally focused on understanding non-pecuniary motivations for prosocial behavior (Benabou and Tirole 2003) and whether and how financial incentives crowd-out or crowd-in these intrinsic and image-based motivations (Gneezy and Rustichini 2000; Frey and Jegen 2002; Benabou and Tirole 2006; Mellstrom and Johannesson 2008). People are motivated to volunteer for many different reasons, so simply knowing that some people respond more positively than others to non-pecuniary incentives does not provide much actionable insight to voluntary organizations seeking to expand their volunteer base.[2] For example, how should voluntary organizations design their messages to resonate with a varied and diverse pool of potential volunteers? What types of messages would best appeal to different subgroups of individuals?

Our study uses data from a field experiment in Singapore to explore whether micro-targeted appeals — messages that are tailored to match the characteristics of subgroups within a target population — can improve the effectiveness of volunteer outreach campaigns in recruiting volunteers. Specifically, we examine which combination of contextual information and motivational frames increased actual volunteering behavior among three subgroups of individuals: current volunteers, former volunteers, and non-volunteers. Current volunteers were people who had, in the past twelve months, undertaken activities to help others outside their household, family, or relatives, without any expectation of financial compensation (NVPC 2012). Former volunteers had volunteered previously but not in the past twelve months and non-volunteers had never volunteered before. Contextual information refers to background information that seeks to raise awareness on

[2]John A. List and his co-authors have conducted extensive research on charitable giving to understand why people give and how to get them to give more. Their work has focused on the use of matching grants, seed money, and challenge gifts to increase the overall amount of donations. Though their work adds to our understanding on why people donate and provides insights for charity organizations, their findings are less applicable to volunteering, which is a very different type of prosocial activity compared to donating. For example, there is no equivalent to matching grants and seed money in volunteering. See (List and Lucking-Reiley 2002; Karlan and List 2007; Rondeau and List 2008; Karlan, List and Shafir 2011).

the importance of a cause, which in our experiment was information about childhood poverty in Singapore. Motivational frames refer to messages that emphasize the beneficial salience of volunteering, with the aim of targeting the underlying motivations that people have for volunteering. We focus on four motivational aspects of volunteering, namely pure altruism, impure altruism, self-image, and self-interest. The field experiment was embedded into the 2014 Individual Giving Survey (IGS), a comprehensive face-to-face interview on volunteering and giving behavior conducted by the National Volunteer and Philanthropy Centre (NVPC) between July and August of 2014. At the end of the survey interview, all respondents were informed of an opportunity to volunteer to help poor children in Singapore through a show of emotional support. Specifically, they were shown a blank postcard by the interviewer and told that they could write or draw a personal message of encouragement to underprivileged children, which they could then mail back to NVPC to give to the children.

In the experiment, all respondents were assigned to either a study group or a control group. The control group received only an outright appeal to volunteer, with no contextual information and no motivational frame provided. Respondents in the study group received one of eight combinations of contextual information and motivational frames (e.g., no information on poverty + altruism frame; information on poverty + altruism frame), followed by an appeal to volunteer. All respondents who indicated their interest to volunteer were given the blank postcard, asked to take some time to think about a message to convey to the children, and told to mail the completed postcard to NVPC within a month from the interview date. Respondents were then prompted by the interviewer to make a plan to return their postcards to NVPC — they were asked to specify when they intended to mail in the postcard.[3] NVPC tracked their subsequent submission of the completed postcard.

The findings demonstrate that current volunteers and former volunteers were 33 percent more

[3] See (Milkman et al. 2011, 2012; Mao 2014) for examples of research that use planning prompts.

likely to express interest in volunteering to help poor children, compared to non-volunteers. However, among those interested in volunteering, volunteer status had no effect on whether they actually volunteered. Interestingly, information about poverty had no effect on actual volunteering behavior across all subgroups of respondents. We suspect that the preliminary information about poor children conveyed sufficient information about the nature and meaningfulness of the proposed volunteering activity, such that additional background information about childhood poverty was deemed superfluous to individual decisions to volunteer. By contrast, the effect of motivational frames varied across the volunteer-type subgroups. The mere opportunity to volunteer appeared sufficient to nudge current volunteers to volunteer — motivational frames had no effect on their actual volunteering behavior. Impure altruism frames were most effective in nudging former volunteers to start volunteering again, whereas pure altruism motivational frames were most effective in nudging non-volunteers to begin volunteering for their first time. Specifically, former volunteers who received an impure altruism frame were 42 percent more likely to volunteer, compared to former volunteers who did not receive any motivational frame. Non-volunteers who received an impure altruism frame were 33 percent more likely to volunteer, compared to non-volunteers who did not receive any motivational frame.

Overall, we build on the work of Clary et al. (1994), Clary et al. (1998), Clary and Snyder (1999) and Al-Ubaydli and Lee (2011), who argued that tailoring messages to target peoples underlying motivations for volunteering could prompt them to volunteer. Specifically, we extend the framework and analyses on micro-targeted messaging, moving beyond current volunteers to include also both former volunteers and non-volunteers. Together, the three subgroups of current volunteers, former volunteers, and non-volunteers comprise a mutually exclusive and exhaustive set of the universe of potential volunteers. The analyses demonstrate that the efficacy of motivational frames in "nudging" (Thaler and Sunstein 2008) people to actually volunteer varies across

the aforementioned subgroups, in accordance with our theoretical predictions on the potential impact of micro-targeted messaging. Further, the evidence of heterogeneous treatment effects on volunteering behavior add a layer of nuance to theories about volunteering and prosocial behavior; they suggest that actual volunteering behavior is the result of interactions between innate propensities to volunteer and situational factors. For example, non-volunteers might have a lower predisposition for volunteering compared to current volunteers, but they can still be nudged to volunteer if exposed to the appropriate type of messaging.

The rest of the paper proceeds as follows. Section 2 presents the theory on micro-targeted appeals to encourage prosocial behavior. Section 3 describes the experimental design and timeline. Section 4 presents the data and Section 5 outlines the evaluation strategy. Section 6 presents the findings. Section 7 concludes.

2.2 Theory: Designing Micro-Targeted Messages to Get People to Volunteer

In this era of big data, politicians increasingly rely on data crunching to target voters — they first identify salient voter characteristics that predict voting behavior and then craft tailored messages for voters based on those characteristics (Hersh and Schaffner 2013). For example, the Obama campaign is widely acknowledged to have leveraged campaign analytics to improve and fine-tune their campaign strategy to improve voter turnout and donations (Pack 2010).[4] Indeed, advertisers and campaign managers are transitioning from blunt, broad-based appeals to incisive, micro-targeted appeals designed to optimize the effect of their messages in changing behaviors (Hillygus and Shields 2008). This shift toward customized messaging has been driven by the increased access to

[4]See also http://www.nytimes.com/2013/06/23/magazine/the-obama-campaigns-digital-masterminds-cash-in.html?pagewanted=all&_r=0

large amounts of personal data (to understand the message recipient), the availability of targeted media platforms such as mobile applications on smartphones (to direct the targeted messages), and advances in experimental methodology (to evaluate which strategies work best among subgroups of the population). Overall, the basic argument is that people respond differently to different messages for reasons that are correlated with their individual characteristics, so customizing messages to match their individual profiles could increase the efficacy of public engagement campaigns in changing peoples' behaviors.

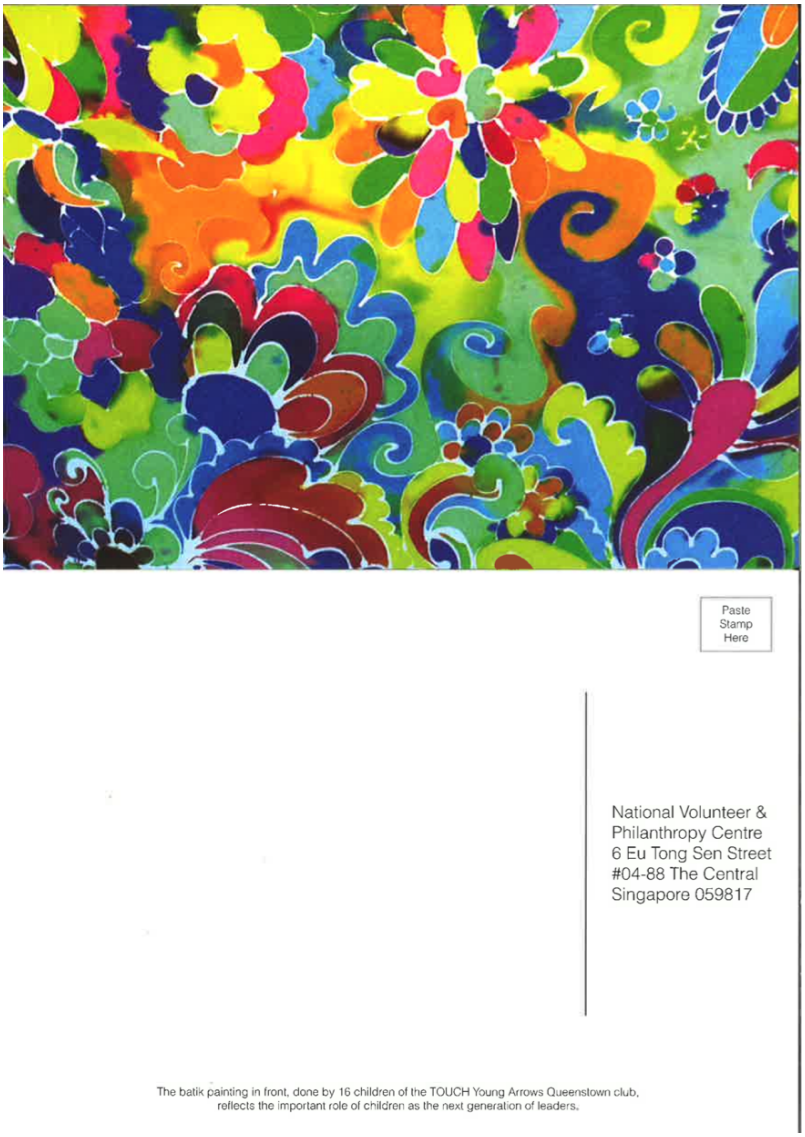
We had proposed to the NVPC that micro-targeted messaging could increase the effectiveness of volunteer outreach campaigns in recruiting volunteers. In an ideal situation, NVPC would have access to a volunteering database that contained information about all residents in Singapore that might predict volunteering, such as their demographic characteristics, personality profiles, and geographic area of residence. The database would also include information on whether each individual was a current volunteer, former volunteer, or non-volunteer. From this database, NVPC would build a predictive model to identify naturally occurring clusters of individuals and their propensities to volunteer. They would then micro-target these individuals and implement randomized controlled trials that stratified on these pre-defined clusters in order to determine which message types would work best for each salient sub-group.

However, NVPC neither maintained nor had access to such a database. We therefore suggested that NVPC focus on three subgroups of individuals that would ex-ante matter from the perspective of a voluntary organization. The three salient subgroups were current volunteers, former volunteers, and non-volunteers. Of course, people make their behavioral choices based on different reasons. We therefore expected to encounter, across the subgroups, individuals who were motivated to volunteer for different reasons, individuals who gave up volunteering for different reasons, and individuals who have never volunteered for different reasons. Even so, what mattered more for

our theory was that individuals within a subgroup were more alike to each other than individuals across subgroups, and that there existed a set of observed and latent characteristics across the subgroups that moderates the effectiveness of different messages on members of each subgroup. In other words, we argued that volunteer status is a salient characteristic of the individual that would determine the efficacy of micro-targeted messages.

The NVPC built on the above insights and proposed examining two characteristics of volunteer appeals — *contextual information* and *motivational frames* — within a field experiment embedded in the IGS 2014 survey. Contextual information refers to background information that seeks to raise awareness on the importance of a cause, whereas motivational frames refer to messages that emphasize the beneficial salience of volunteering, with the aim of targeting the underlying motivations that people have for volunteering. Because NVPC did not know ex-ante the volunteer status for each respondent, they had to randomly assign the contextual information and motivational frame treatments across the entire sample of respondents, rather than within strata of current volunteers, former volunteers, and non-volunteers. We return to this discussion in the next section. At the end of the IGS 2014 survey interview, NVPC would inform all respondents of an opportunity to volunteer to help poor children in Singapore through a show of emotional support. Respondents would be shown a blank postcard and told that the volunteering opportunity would involve writing or drawing a personal message of encouragement to underprivileged children, and then mailing the completed postcard to NVPC to give to the children (see Figure 2.1 below for an example of a blank postcard). The NVPC would then administer the field experiment to examine which combinations of contextual information and motivational frames would be most effective in nudging respondents to volunteer to help the poor children.

Figure 2.1: *Blank Postcard Given to Respondents Who Were Interested to Volunteer*



For the purposes of the experiment, the relevant contextual information was background information on childhood poverty in Singapore and how children growing up in low incomes families experienced more stress and lacked adequate resources to succeed in school.[5] NVPC believed that providing respondents with this information would raise their awareness of childhood poverty as an important social issue in Singapore and in turn increase their likelihood of volunteering. Awareness about social issues is a strong predictor of volunteering (Wilson 2000). We therefore hypothesize that contextual information would influence actual volunteering as follows:

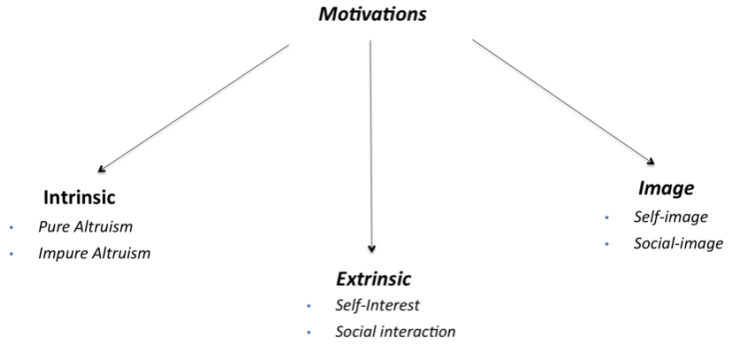
> (1) *Respondents who received background information on poverty would be more likely to volunteer to help poor children, relative to those who do not receive any background information on poverty.*

There exist three broad motivations for pro-social behavior: intrinsic, extrinsic, and image motivation. *Intrinsic motivation* is the value of giving per se, represented by private preferences for others' well-being. *Extrinsic motivation* is associated with a material private reward or benefit, either monetary or non-monetary, that is obtained as part of the giving process, such as thank-you gestures, tax breaks, and career and social-networking opportunities. *Image motivation* refers to individuals' concern for how others perceive them and their own self-perception — the desire to be liked and respected by others and one's self-esteem. Figure 2.2 and Table 2.1 below summarize this framework. Note that previous research has generally examined why people volunteer, but not why they stopped volunteering or have never volunteered. We argue that the various motivations for volunteering are universal in nature, so they would also apply to former volunteers and non-volunteers, though perhaps to a smaller extent. For example, former volunteers and non-volunteers

[5]The exact wording was: "To give you a brief background, childhood poverty is an important issue in Singapore. Today, about 10 percent of households earn less than S$1,250 a month. This is the average amount needed by a four-person household to meet basic needs such as clothing, food, shelter, and other essentials. Children from these households are severely disadvantaged growing up as they experience more stress and lack adequate resources to succeed in school. Volunteer organizations are trying to address this issue and are seeking volunteers to help poor children."

might be intrinsically motivated to help others, but are constrained from doing so because of a lack of time.

Figure 2.2: *Motivations for Volunteering*



Ideally, NVPC would have designed and tested messages that matched all the motivations outlined in Figure 2.2. However, concerns about sample size and lack of statistical power compelled NVPC to limit the number of motivational frames that they could include in the field experiment. NVPC eventually decided to target four well-known motivations for prosocial behavior: pure altruism, impure altruism, self-image, and self-interest.

In the experiment, these motivational frames were administered immediately after the contextual information treatments. The survey interviewers began with a rhetorical question, asking respondents: "why should you volunteer?". They then read out messages designed to prime respondents to think about the various motivational aspects of volunteering, by sharing how volunteers would respond to the previous question. For example, the pure altruism motivational frame targeted individuals who genuinely care about the welfare of others (Becker 1974; Piliavin and Charng 1990; Unger 1991; Andreoni, Harbaugh and Vesterlund 2007); recipients of this frame were told that many volunteers believed that volunteering allowed them to make a real difference in the lives of the poor children. By contrast, the impure altruism motivational frame targeted individuals who derived a warm glow satisfaction from the act of helping, without concern for the

Table 2.1: *Description of Motivations for Pro-social Behavior*

Motivations	Description
Intrinsic: Pure Altruism	The satisfication people get from helping others; motivation stems solely from an interest in the recipients' welfare.
	Appeals to pure altruism often incorporate testimonials from the people affected by the behaviors in question, emphasizing the potential positive or negative impacts (e.g., information about how one's volunteering or donations can impact the lives of the poor).
Intrinsic: Impure Altruism	The "warm glow" satisfaction that is derived simply from giving to a cause or doing good deeds; the utility that one gets simple from the *act of giving, without specific concern for the interests of others*.
	A prominent example is the Red Cross "Feel Good, Give Blood" appeal for blood donations
Extrinsic: Self-Interest	Any material reward or benefit, either monetary or non-monetary, associated with giving, such as thank-you gestures and tax breaks.
	In persuading potential donors to contribute, the Metropolitan Opera, for example, gives "many wonderful benefits that include: a subscription to OPERA NEWs, member discounts on merchandise, lectures and backstage tours, ticket priorities and much, much more!"
Extrinsic: Social Interaction	Satisfaction from engaging with others and making new friends while working on an activity together (this may be especially strong if individuals' expect the people they will meet are likely to be pro-social types who would make good friends)
Image: Self-Image	Refers to individuals' need to maintain conformity between their actions, or even feelings, and certain values, long-term goals, or identities they seek to uphold.
	The marketing focus is on linking good behavior with an estimable self-identity (e.g., a hero, friend) and character traits (e.g., courage, loyalty) and linking bad behavior to undesirable identities and traits.
Image: Social Image	Refers to individuals' tendency to be motivated partly by how others perceive them; seek social approval for behavior.
	Conformity to social norms is an example of such a motivation.
	Appeals along these lines typically create a visible "badge" or mechanism that makes a person's behavior and support for the cause visible to others in their community (e.g., wristbands).

welfare of others (Andreoni 1989, 1990); recipients of this frame were told that many volunteers believed that volunteering provided them with a strong feeling of satisfaction and pride. The self-image motivational frame targeted individuals who possessed a strong desire to conform to their internal images of themselves society (Benabou and Tirole 2003; Ariely, Bracha and Meier 2009). In this case, the NVPC focused on the image of being a contributing member of society; recipients of the self-image frame were told that many volunteers believed that volunteering was an important part of being a good citizen. The self-interest motivational frame targeted individuals who sought out personal benefits from volunteering, such as enhancing their resume or expanding their

social networks (Clary et al. 1998). Recipients of this frame were told that many volunteers believed that volunteering provided them with valuable new skills and experiences. Table 2.2 below summarizes. See Appendix A-1 for more information.

Table 2.2: *Summary of Motivational Frame Treatments*

Motivational Frame	Wording
Pure altruism	Many volunteers believe that by volunteering, you can make a real difference in the lives of these poor children.
Impure altruism	Many volunteers believe that volunteering gives you a strong feeling of satisfaction and pride.
Self-image	Many volunteers believe that volunteering is an important part of being a good citizen.
Self-interest	Many volunteers believe that volunteering provides you with valuable new skills and experiences.

What types of motivational frames would best appeal to current volunteers, former volunteers, and non-volunteers? Previous research suggests that tailoring messages to match volunteers' underlying motivations for volunteering could improve their overall satisfaction with volunteering work (Clary, Snyder and Ridge 1992; Clary et al. 1994, 1998) and encourage them to volunteer more (Al-Ubaydli and Lee 2011).[6] The upshot is that messages are most effective when they are micro-targeted — altruistic volunteers would respond most positively to messages that emphasize how others benefit from their work, whereas career-oriented volunteers would respond most positively to messages that emphasize how volunteering helped them pick up new skills. Note, however, that none of the above research directly examined how messages could be designed to entice former volunteers and non-volunteers to begin volunteering. Hence the purpose of the NVPC study, which sought to uncover the types of messaging that would be most effective in nudging current volunteers, former volunteers, and non-volunteers to volunteer.

Overall, we hypothesized that the motivational frame treatments would have the following effects on volunteering behavior:

[6]See Wilson (2000, 2012) for excellent overviews on why people volunteer.

(2) *Current volunteers and former volunteers would be more likely to volunteer, compared to non-volunteers.* This accords with the findings that past history of volunteering predicts current volunteering (Wilson 2000).

(3) *Current volunteers who received a motivational frame would be no more likely to volunteer, relative to current volunteers who did not receive a motivational frame.* We suggest that this is because volunteers are generally more likely to volunteer when asked, irrespective of the message frame.

(4) *Former volunteers who received either an impure altruism or self-interest motivational frame would be more likely to volunteer, relative to former volunteers who did not receive a motivational frame.* Many former volunteers stopped volunteering because they lacked the time to do so or became disillusioned with the volunteering process. Appeals to impure altruism and self-interest could prompt former volunteers to take up volunteering again by either reminding them of the warm glow effect they experienced when they previously volunteered, or providing an incentive to reduce the costs of volunteering.

(5) *Non-volunteers who received a self-interest motivational frame would be more likely to volunteer, relative to non-volunteers who did not receive a motivational frame.* Many non-volunteers never took the first step to volunteer because they lacked the time or were less prosocial nature by nature. Appeals to self-interest could prompt non-volunteers to begin volunteering for the first by reducing the costs of volunteering.

2.3 Experimental Design

This section motivates the experimental design, which sought to evaluate whether *contextual information* and *motivational frames* could increase actual volunteering behavior among three types of individuals — current volunteers, former volunteers, and non-volunteers. We first detail the experimental design and treatments. We then present the experimental timeline.

2.3.1 Experimental Design: Random Assignment to Treatments

The ideal experimental design would comprise a stratified randomization, stratifying on volunteer status and the URA's planning area. The NVPC would have data on the respondents' planning area of residence and volunteer status, prior to the commencement of the field experiment. They would use the data to create planning area/volunteer status strata and then randomly assign respondents within strata to either one of the eight treatment combinations from a 2 X 4 factorial design (Factor 1: Contextual Information — No information on poverty vs. information on poverty; Factor 2: Motivational Frame — Pure Altruism vs. Self-Image vs. Self-Interest vs. Impure Altruism) or a control condition.[7] Table 2.3 below summarizes.

[7]See Fisher (1935), Friedman and Sunder (1994), and Box, Hunger and Hunter (1978) for more information on factorial designs.

Table 2.3: *The 2 X 4 Factorial Design*

Treatment Combinations in the 2 X 4 Full Factorial Design		
Treatment Groups	**Factor 1: Contextual Information**	**Factor 2: Motivational Frame**
1	No information about poverty	Pure Altruism
2	No information about poverty	Self-Image
3	No information about poverty	Self-Interest
4	No information about poverty	Impure Altruism
5	Information about poverty	Pure Altruism
6	Information about poverty	Self-Image
7	Information about poverty	Self-Interest
8	Information about poverty	Impure Altruism
Control	No contextual information	No motivational frame

In practice, the NVPC was unable to implement the ideal experimental design because they lacked ex-ante information on respondents' volunteer status prior to the commencement of the IGS 2014 survey. They therefore adopted a stratified randomization design, stratifying only on the URA's planning area.

2.3.2 Experimental Timeline

Table 2.4 below outlines the experimental timeline, which was divided into the pre-survey phase, during survey phase, and post-survey phase.

The pre-survey phase began in June 2014, a month before the fieldwork for the IGS 2014 commenced. At this stage, NVPC purchased a sampling frame containing a list of 5,000 households from the Singapore Department of Statistics.[8] Households in the sampling frame were then assigned to one of the eight treatment groups or control group.

The during survey phase took place between August 2014 to September 2014. The NVPC

[8]The Singapore Department of Statistics (DOS) maintains a National Database on Dwellings (NDD) in Singapore. This database is updated monthly to provide a comprehensive sampling frame for conducting household surveys. DOS stratifies according to the Urban Redevelopment Authority's (URA) planning areas and implements probability proportional to size sampling within each strata.

Table 2.4: *The Experimental Timeline*

Phase	Steps
Pre-survey	1. NVPC obtained household sampling frame from Department of Statistics 2. Households in sampling frame were assigned to treatments prior to survey fieldwork
During survey	1. NVPC conducted face-to-face survey for the IGS 2014 2. At the end of the survey interview, NVPC informed respondents of an opportunity to help poor children in Singapore through emotional support. Respondents weretold that they can write or draw a personal message of encouragement on a postcard (shown to them) and mail it back to NVPC 3. Contextual information and motivation frame treatments were administered. 4. Respondents were then asked if they would like to volunteer to help poor children through emotional support through the postcard. 5. Interested respondents were provided with the blank postcard and told to mail their submission within a month of the survey. Respondents were then asked to specify the date they intended to mail the postcard
Post-survey	1. NVPC tracked respondents' submission of postcard 2. Tracking ended one month after the survey

began by conducting a comprehensive face-to-face interview with residents on their volunteering and giving behavior in the past 12 months. At the end of the survey interview, NVPC informed the respondents of an opportunity to help poor children in Singapore through emotional support. Respondents were shown a blank postcard and told that they could write or draw a personal message of encouragement on the postcard, which they could then mail back to NVPC to give to the children. NVPC then administered the contextual information and motivational frame treatments. Respondents were then asked whether they would be interested to volunteer to help poor children through emotional support with the postcard. All respondents who indicated their interest to volunteer were given the blank postcard, asked to take some time to think about a message to convey to the children, and told to mail the completed postcard to NVPC by a month from the interview date. They were then prompted by the interviewer to make a plan to return the postcard to NVPC — the interviewers asked them to specify when they intended to mail in the postcard.[9]

In the post-survey phase, the NVPC tracked respondents' submission of the postcard for up to a month after the survey interview. See Figure 2.3 in below for an illustration of the completed postcards. We assumed that respondents who did not submit the postcard within the one-month window were unlikely to do so subsequently.

[9]See Milkman et al. (2011, 2012) and Mao (2014) for examples of research that use planning prompts.

Figure 2.3: *Blank Postcard Given to Respondents Who Were Interested to Volunteer*

2.4 The Experimental Data and Evaluation Strategy

This section describes the data from the field experiment and IGS 2014 surveys and our evaluation strategy. We begin with an overview of the data. We then evaluate whether randomization achieved balance in observed covariates across the treatment and control groups of interest. Finally, we discuss the evaluation strategy.

2.4.1 Overview of Data

The fieldwork for the IGS 2014 survey interviews was conducted between July 2014 and August 2014. The NVPC interviewed a total of 1,828 respondents living in 30 planning areas. The outcome of interest is whether the respondent actually volunteered, which we measure using the binary variable volunteered, which equals one if the respondent completed and mailed the postcard to NVPC, and 0 otherwise. Approximately 11.1 percent of the respondents were assigned to each of the nine treatment groups, which suggest that the randomization was properly implemented.[10] Table 2.5 below summarizes.

The demographic characteristics of IGS 2014 respondents are generally similar to those of the national population's. That said, IGS 2014 respondents are on average older, more educated, and less likely to be male. For the IGS 2014 sample, 44.4 percent are male and 83.5 percent are Singaporean citizens; the median age is 45; Chinese comprise 70.7 percent, Malays 13 percent, Indians 11.4 percent, and other races 4.9 percent; 75.4 percent received a secondary education or higher, and 94.5 percent of residents live in a 3-room/4-room/5-room flat. By contrast, in the national population, 49.2 percent are male and 86.2 percent re Singaporean citizens; the median age is 38.9. Chinese comprise 74.2 percent, Malays 13.3 percent, Indians 9.2 percent, and other races

[10]The numbers of respondents assigned to each treatment group are not exact because some respondents were not home when the interviewers visited. SCDF revisited these households a second time, and if they were still not home, they were excluded from the analysis.

Table 2.5: *Randomization Across Treatment Groups*

Treatment Group	Subtotal	% of total respondents
1	208	11.4
2	205	11.2
3	200	10.9
4	182	10.0
5	208	11.4
6	227	12.4
7	199	10.9
8	194	10.6
Control	205	11.2
Total	1828	

3.3 percent; 68.8 percent received a secondary education or higher, and 92.9 percent of residents live in a 3-room/4-room/5-room flat. Table 2.6 below summarizes.

Table 2.6: *Comparison of Demographic Profile of IGS 2014 Sample and National Population*

Characteristic	IGS 2014 Survey	National Population
Male	44.4	49.2
Singapore citizen	83.5	86.2
Age	44.6	38.9
Chinese	70.7	74.2
Malay	13	13.3
Indian	11.4	9.2
Other	4.9	3.3
Secondary education	75.4	68.8
3/4/5 room flat	94.5	92.9

2.4.2 Evaluating Covariate Balance Across Treatment and Control Groups

In theory, randomization would ensure that the treatment and control groups were, on average, similar across both observable and unobservable characteristics. However, there still exists the possibility that the particular randomizations drawn for the experiment would result in imbalanced

treatment and control groups. The IGS 2014 contains pre-treatment covariates that would allow us to check whether randomization achieved balance across the treatment and control groups, and to use statistical adjustment when estimating the causal effects of interest if balance were not achieved. Following Mao (2014), we include a range of control variables that might influence volunteering, which we group into three broad categories: (1) Individual characteristics; (2) Attitudes toward giving; and (3) Contextual environment characteristics. Appendix A-2 summarizes the data.

The factorial design of our experiment implies that the relevant treatment and control groups would differ when evaluating the effect of contextual information and motivational frames on volunteering behavior. For estimating the causal effect of contextual information, we focus on *contextual information treatment group* (all residents in Treatment Groups 5, 6, 7, and 8) and the *no contextual information treatment group* (all residents in Treatment Groups 1, 2, 3, and 4). Note that we exclude a "pure" test of the information treatment — a treatment condition that contains information on poverty without a motivation frame. Instead, we evaluate the average effect of information across all motivation frames. We do so because real-world advocacy involves information paired with a particular motivation frame; volunteer organizations rarely engage the public by providing them only with information. The study therefore provides NVPC with interventions that could subsequently be scaled up. By contrast, for estimating the causal effect of motivational frames, we focus on the altruism treatment group (the subset of respondents in Treatment Groups 1 and 5 who were interested to volunteer), the self-image treatment group (the subset of respondents in Treatment Groups 2 and 6 who were interested to volunteer), the self-interest treatment group (the subset of respondents in Treatment Groups 3 and 7 who were interested to volunteer), the impure altruism treatment group (the subset of respondents in Treatment Groups 4 and 8 who were interested to volunteer), and the control group (the subset of respondents in Treatment Group

9 who were interested to volunteer). Tables 2.7 and 2.8 below summarize.

Table 2.7: *Overview of Treatment and Control Groups for Contextual Information*

	Info Group	**No Info Group**
Contextual Information	All respondents in Treatment Groups 5, 6, 7, 8	All respondents in Treatment Groups 1, 2, 3, 4

Table 2.8: *Overview of Treatment and Control Groups for Motivational Frames*

	Pure Altruism group	**Self-Image Group**	**Self-Interest Group**	**Impure Altruism Group**	**Control Group**
Motivational Frame	Subset of respondents in Treatment Groups 1 and 5 who were interested to volunteer	Subset of respondents in Treatment Groups 2 and 6 who were interested to volunteer	Subset of respondents in Treatment Groups 3 and 7 who were interested to volunteer	Subset of respondents in Treatment Groups 4 and 8 who were interested to volunteer	Subset of respondents in Treatment Group 9 who were interested to volunteer

To verify that randomization had successfully achieved balance across the treatment and control groups, we implement both univariate and multivariate balance diagnostics. The univariate balance diagnostics comprise a difference-in-means and corresponding two-sample t-test with unequal variances, and a two-sample Kolmogorov-Smirnov (KS) test.[11] We consider a covariate imbalanced if the p-values from both the two-sample t-test and KS test are significant at the 5 percent level. The multivariate balance check comprises a regression of a trichotomous treatment variable that indicates assignment to one of the five treatment groups (e.g., control group/pure altruism/self-image/self-interest/impure altruism) on the control covariates. We consider the covariates to be imbalanced if they are jointly significant in predicting the trichotomous treatment variable.

Overall, the balance diagnostics suggest that randomization achieved experimental balance across all the relevant groupings of interest: (1) Contextual information treatment group vs. No

[11] See Mao and Vreeland (2012, 2013) for an example on reporting balance diagnostics.

contextual information control group, (2) Pure altruism treatment group vs. Control group; (3) Self-Image treatment group vs. Control group; (4) Self-Interest treatment group vs. Control group; (5) Impure altruism treatment group vs. Control group. See Appendix A-3 for more information.

2.4.3 Evaluation Strategy

We seek to evaluate the effect of contextual information (information on poverty vs. no information on poverty) on volunteering behavior, and the effect of motivational frames (pure altruism, self-image, self-interest, and impure altruism) on volunteering behavior. For each evaluation, we present logistic regression estimates of the average treatment effects, controlling for pre-treatment covariates that might predict volunteering behavior and including regional fixed effects with standard errors clustered at the planning area level. We implement the logistic regression models across each of the three subgroups of current volunteers, former volunteers, and non-volunteers.

2.5 Experimental Findings

In this section, we present the experimental findings. We first present descriptive statistics of how volunteering behavior varied across the subgroups of current volunteers, former volunteers, and non-volunteers. Next, we examine the effect of contextual information on volunteering behavior. We then examine the effect of motivational frames on volunteering behavior.

2.5.1 Did Volunteering Behavior Vary by Volunteer Status?

Both current volunteers and former volunteers were significantly more likely to express interest to volunteer to help poor children through emotional support. Specifically, current volunteers were 38 percent more likely to volunteer, compared to non-volunteers (78 percent for current volunteers

vs. 57 percent for non-volunteers); former volunteers were 24 percent more likely to volunteer, compared to non-volunteers (70 percent for current volunteers vs. 57 percent for non-volunteers). Current volunteers were slightly more likely to express interest to volunteer, compared to former volunteers, though this difference was statistically insignificant.

Interestingly, within the subset of those interested in volunteering, volunteer status had no significant effect on whether they actually volunteered. We suggest that this is because of the planning prompt that was administered to the respondents who agreed to volunteer, which helped reduce the gap between intentions and actions. Volunteer status influenced the likelihood that one would be interested in a volunteering opportunity, but had no effect on subsequent volunteering behavior among those who were interested to volunteer.

2.5.2 Did Contextual Information Increase Volunteering Behavior?

Contrary to predictions, information about poverty had no effect on actual volunteering behavior across all subgroups of respondents. We suggest that the preliminary information about poor children conveyed sufficient information about the nature and meaningfulness of the proposed volunteering activity, such that additional background information about childhood poverty was deemed superfluous to individual decisions to volunteer.

2.5.3 Did Motivational Frames Increase Volunteering Behavior?

The effect of motivational frames varied across the volunteer-type subgroups. Figure 2.4 below presents the descriptive statistics of volunteering behavior across the motivational frame treatments for the subset of current volunteers. A higher proportion of those who received the self-interest frame volunteered (32 percent), compared to those in the control group (26 percent), though this difference was not significant. The effects of the pure altruism, self-image, and self-interest al-

truism motivational frames were also not significantly different from those of the control group. Overall, motivational frames had no effect on actual volunteering behavior among current volunteers. It would seem that the mere opportunity to volunteer — in this case, writing or drawing a message of encouragement to poor children on a blank postcard and mailing the completed postcard to NVPC — was sufficient to nudge current volunteers to volunteer.

Figure 2.4: *Volunteer Behavior Across Motivational Frames, Among Current Volunteers*

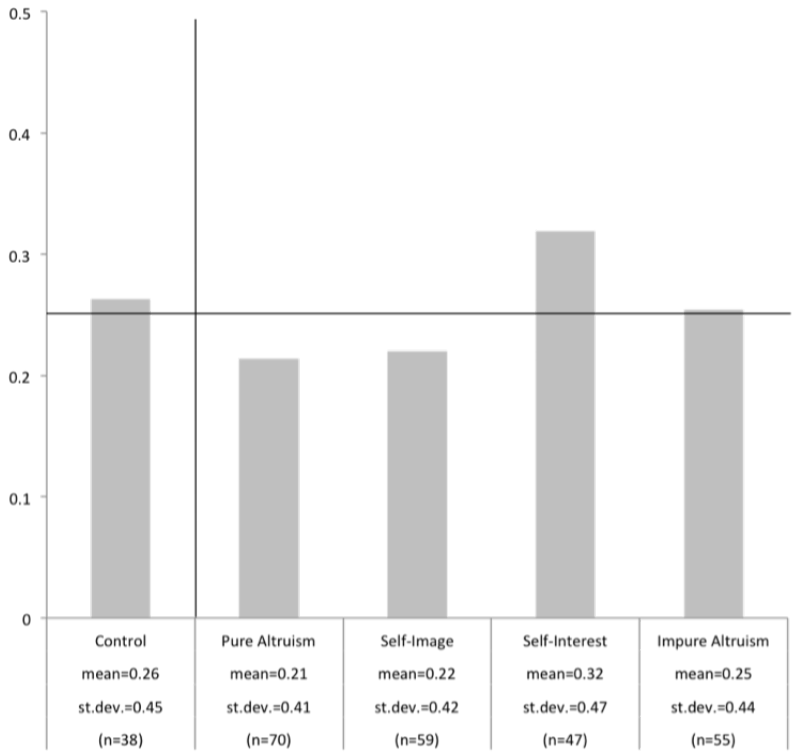


Figure 2.5 below presents the descriptive statistics of volunteering behavior across the motivational frame treatments for the subset of former volunteers. A higher proportion of those who received the impure altruism frame volunteered (37 percent), compared to those in the control group (8 percent), an increase of 42 percent. The effects of the pure altruism, self-image, and

self-interest altruism motivational frames were not significantly different from those of the control group. Overall, impure altruism frames were most effective in nudging former volunteers to start volunteering again.

Figure 2.5: *Volunteer Behavior Across Motivational Frames, Among Former Volunteers*

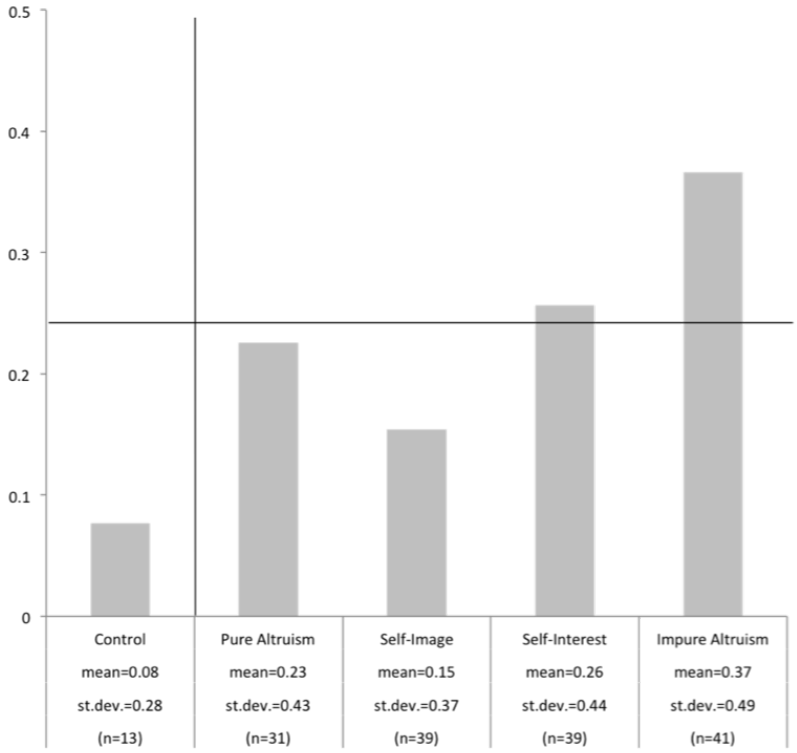
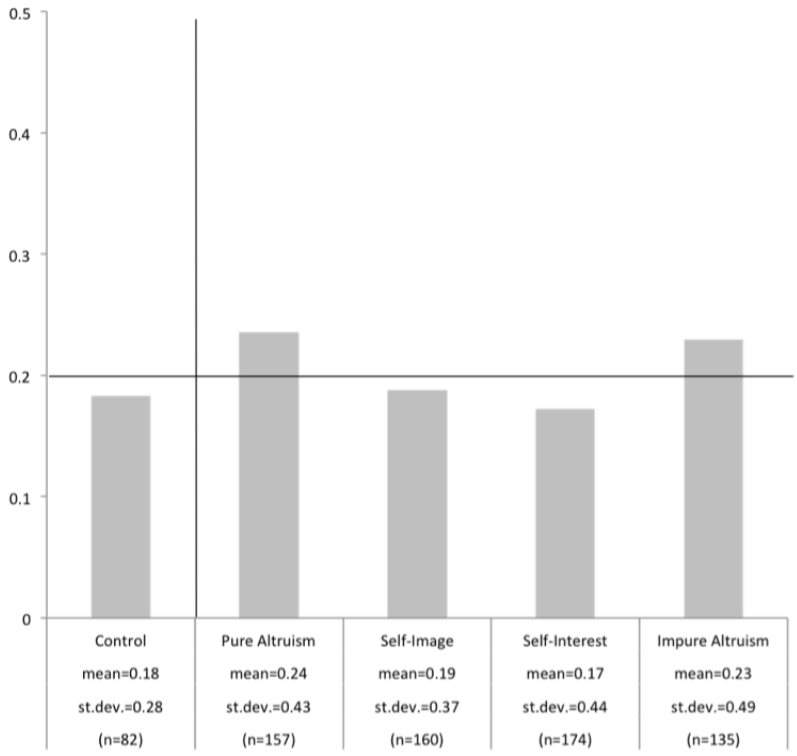


Figure 2.6 below presents the descriptive statistics of volunteering behavior across the motivational frame treatments for the subset of non-volunteers. A higher proportion of those who received the pure altruism frame volunteered (24 percent), compared to those in the control group (18 percent), an increase of 33 percent. The effects of the impure altruism, self-image, and self-interest altruism motivational frames were not significantly different from those of the control group. Overall, pure altruism frames were most effective in nudging non-volunteers to begin volunteering for the first time.

Figure 2.6: *Volunteer Behavior Across Motivational Frames, Among Non-Volunteers*



2.6 Conclusion

Overall, we demonstrate that the efficacy of motivational frames varied across the subgroups of current volunteers, former volunteers, and non-volunteers. Specifically, impure altruism frames were most effective in nudging former volunteers to volunteer again, whereas pure altruism frames were most effective in nudging non-volunteers to volunteer for the first time. Note that our experiment focused on residents living in Singapore and examined their decision to volunteer to help poor children through a show of emotional support, by writing or drawing a personal message of encouragement on a postcard and then mailing that to NVPC. Though the act of crafting a personal message on the postcard and mailing it to NVPC represents a costly signal of prosocial behavior, especially when compared to stated intentions to volunteer in the future, it still differs from most other types of volunteering that require sustained and costlier commitment. It therefore remains possible that our specific findings were idiosyncratic to the proposed volunteering activity and might not generalize to other types of volunteering. That said, we argue that our proposed framework of micro-targeted messaging to appeal to the subgroups of current volunteers, former volunteers, and non-volunteers is generally applicable to volunteer outreach programs across a wide range of issues, for two reasons: (1) the aforementioned subgroups encompass the universe of potential volunteers that volunteer organizations would generally seek to recruit; (2) the proposed modifications to the volunteer appeals are costless and easily implementable, since they require only the inclusion of a short sentence that emphasizes a motivational aspect of volunteering.

The presence of heterogeneous treatment effects in our analyses suggests that adopting a more data-driven approach toward volunteer recruitment — in the form of micro-targeted messaging — could result in significant improvements to the effectiveness of volunteer outreach programs. As volunteer organizations learn more about their potential pool of volunteers and collect more data on their preferences and activities, they can leverage the data to build profiles of different

subpopulations of individuals and design and test which messages would best appeal to each subpopulation. This would in turn allow them to transition from using blunt, broad-based appeals to incisive, customized appeals designed to optimize the effect of their messages in encouraging people to volunteer.

Chapter 3

Leveraging Behavioral Insights to Improve the Efficacy of Public Engagement Campaigns: Experimental Evidence from Singapore

Can behavioral modifications to an ongoing public engagement campaign increase its efficacy in changing behaviors? We used data from a series of randomized experiments to evaluate whether a combination of *contextual frames* and *follow-through prompts* increased attendance at the Community Emergency Preparedness Program (CEPP), a full-day course that teaches emergency preparedness skills. Contextual frames refer to messages that highlight to residents the beneficial salience of undertaking a specific action, with the aim of convincing them to change their behavior. Follow-through prompts refer to further engaging residents who have indicated an interest to change their behavior, with the aim of transforming their intentions into concrete actions. We find

that contextual frames were significantly more effective in increasing residents' interest to attend the CEPP, compared to an outright appeal, but were insufficient in changing behaviors. The follow-through prompt that leveraged making a plan, commitment and reminder mechanisms, and social pressure succeeded in increasing CEPP attendance. Our findings suggest that behavioral interventions that simultaneously target multiple psychological and cognitive barriers to behavioral change could have greater impact on behavior, compared to those that focus only on a single barrier to behavioral change.

3.1 Introduction

Governments spend hundreds of millions of dollars each year on public engagement campaigns to promote public safety, raise awareness of important social issues, inform citizens about major enhancements to existing government policies, and signal changing priorities in the legislative agenda.[1] Such campaigns generally take the form of passive appeals through mainstream and print media (e.g. news reports and posters), or active community engagement efforts (e.g., town hall discussions and face-to-face appeals). Besides communicating information, the ultimate aim of such efforts is to engender behavioral change among citizens.[2] The specific content of appeals and the media through which they are delivered may influence their effectiveness in shaping behaviors in the desired fashion. Yet little rigorous research has been undertaken to assess the efficacy of government communications strategies, or to examine how they could be optimally designed. Academics and practitioners have primarily focused on how public engagement campaigns influence public opinion (Nan 2008; Stephanson 2003; Shen and Dillard 2007; Stockmann, Esarey and Zhang 2010), with many implicitly assuming that shifts in attitudes prompt corresponding changes

[1] According to Kosar (2014), executive branch agencies spent US$892.5 million on advertising contracts in 2013.

[2] For example, traffic safety campaigns seek to lower the rate of speeding-related traffic accidents by encouraging motorists to drive safely.

in behavior (Allport 1935; Azjen and Fishbein 1980; Fazio 1990; Ajzen 1991; Fazio and Towles-Schwen 1999).[3] However, people often behave in ways that seemingly contradict their underlying attitudes toward an issue (Sheeran 2002; Bartels 2005; Sniehotta, Scholz and Schwarzer 2005). Public engagement campaigns might succeed in changing behavioral intent and attitudes but have minimal impact on behavioral outcomes because people fail to act on their intentions. The true usefulness of public engagement campaigns — whether and how they actually change behaviors — is therefore unknown.

People often fail to follow-through on their good intentions because they procrastinate, forget, or lose interest over time. Much of the recent applied research in behavioral economics and psychology has focused on designing interventions to bridge the gap between intentions and behavior. It collectively seeks to demonstrate how relatively costless interventions that target the psychological and cognitive barriers to behavioral change can successfully "nudge" (Thaler and Sunstein 2008) people to behave differently. For example, asking people if they intend to embark on a course of action (Greenwald et al. 1987; Fitzsimons and Morwitz 1996; Nelson and Norton 2005), pre-committing to a course of action by eliminating future alternatives (Thaler and Shefrin 1981; Schelling 1984, 1992; Wertenbroch 1998), setting goals (Klein 1991; Latham and Locke 1991; Locke and Latham 2002), making concrete plans (Sniehotta, Scholz and Schwarzer 2005; Rogers et al. 2011; Milkman et al. 2012), publicly committing to a course of action (Burn and Oskamp 1986), setting deadlines (Ariely and Wertenbroch 2002), and providing reminder prompts (Milkman et al. 2011, 2012; Vervloet et al. 2012) are but some interventions that have been found to be effective in changing behaviors across a wide variety of settings.

Our study applied the aforementioned insights from the behavioral economics and psychology literatures to the design of public engagement campaigns. We examined whether behavioral

[3]For an excellent overview of the academic literature on the link between attitudes and behavior, see Azjen and Fishbein (2005).

modifications to an ongoing public engagement campaign could increase its efficacy in changing behaviors. Specifically, we partnered with the Singaporean Ministry of Home Affairs and Singapore Civil Defense Force (SCDF) to examine how they could modify their post-fire blitz campaign to increase attendance at the Community Emergency Preparedness Program (CEPP).[4] The post-fire blitz is a community engagement effort that comprises door-to-door household visits by SCDF officers to educate residents about fire safety; the CEPP is a full-day course that teaches basic first aid, fire safety, and other emergency-related skills. We used data from a series of randomized experiments to evaluate whether a combination of two behavioral modifications to the post-fire blitz — *contextual frames* and *follow-through prompts* — increased CEPP interest and attendance among residents. Contextual frames refer to messages that highlight to residents the beneficial salience of undertaking a specific action, with the aim of convincing them to change their behavior. Follow-through prompts refer to further engaging residents who have indicated an interest to change their behavior, with the aim of transforming their intentions into concrete actions.

In the experiment, all residents were assigned to either a study group or a control group. The control group received only an outright appeal to attend the CEPP, with no contextual frame or follow-up prompt. All residents in the study group first received either one of the following contextual frames: a self-interest frame that emphasized how they and their family benefited from their attending the CEPP, or a communitarian frame that highlighted how their community benefited. They were then asked if they would be interested to attend the CEPP. Next, those who indicated their interest to attend the CEPP received one of two follow-through prompts.[5] They were provided with either an informational package on CEPP sessions in the upcoming month and a map with directions to the CEPP, or a preregistration package comprising the informational

[4]The Singapore Ministry of Home Affairs is tasked with ensuring a safe and secure domestic environment for all Singaporeans. It oversees several "Home Team" agencies, including the Singapore Police Force, Singapore Civil Defence Force, and Singapore Prison Service. For more information, see http://www.mha.gov.sg/overview.aspx?pageid=187&secid=28.

[5]Note that residents who were not interested to attend the CEPP did not receive a follow-through prompt.

package, a prompt to preregister to attend the CEPP, an appointment postcard, and a notification that they might be contacted by the SCDF to share their feedback on the CEPP. The SCDF tracked all residents' subsequent attendance at the CEPP.

The findings demonstrate that contextual frames were significantly more effective in increasing residents' interest to attend the CEPP, compared to an outright appeal. Specifically, including a contextual frame increased the percentage of residents who were interested to attend the CEPP by 72 percent (40.7 percent in the control group vs. 70 percent in the contextual frame treatment groups). The communitarian frame (72.8 percent) was marginally more effective than the self-interest frame (67.6 percent) in increasing CEPP interest, though this difference was statistically insignificant. Contextual frames, however, proved insufficient in changing behaviors. Ninety-nine percent of residents who had indicated their interest to attend the CEPP did not do so, thus revealing a gap between intentions and behavior. By contrast, the findings for the follow-through prompts were mixed. Receiving an informational package on upcoming CEPP sessions had a negligible effect on CEPP attendance, whereas receiving the preregistration package significantly increased CEPP attendance. Specifically, 11.3 percent of those who received the preregistration package (and 15.7 percent of those who actually preregistered) attended the CEPP, compared to 1.3 percent for the informational package treatment group and 0 percent for the control group. Interestingly, 22 percent of those who attended the CEPP brought their family members with them, so the reported treatment effects represent conservative estimates that do not account for possible network and contagion effects.

Overall, the most effective behavioral intervention — contextual frame followed by the preregistration package — paired persuasive communication with a follow-through prompt that incorporated making a plan, commitment and reminder mechanisms, and social pressure. Its sizable effect on CEPP attendance suggests that behavioral interventions that simultaneously target

multiple psychological and cognitive barriers to behavioral change could have greater impact on behavior, compared to those that focused only on a single barrier to behavioral change. Our proposed intervention is similar to the planning prompt introduced in Milkman et al. (2011, 2012), but goes a step further by linking the planning process with other intention-behavior bridging mechanisms. The preregistration package was only administered on residents who had expressed an interest to attend the CEPP; these residents were prompted to make a concrete plan to attend the CEPP, publicly commit to see their plan through by preregistering via the SCDF officer, provided with a visual reminder of their plan and commitment, and told that they might be contacted by the SCDF for a follow-up survey. We obtained an intent-to-treat effect of 11.3 percent, compared to Milkman et al. (2012)'s 1 percent finding. More importantly, the proposed behavioral intervention is nearly costless, easily integrated into existing public engagement campaigns, and designed to address universal psychological and cognitive barriers to behavioral change. We therefore argue that the experimental findings are applicable to public engagement campaigns across a wide range of issues, and might even generalize to other settings.

The rest of the paper proceeds as follows. Section 2 overviews emergency preparedness in Singapore and describes the Community Emergency Preparedness Program and the post-fire blitz campaign. Section 3 presents the theory on designing public engagement campaigns to change behaviors. Section 4 describes the experimental design and timeline. Section 5 presents the data and Section 6 outlines the evaluation strategy. Section 7 presents the findings. Section 8 concludes.

3.2 Emergency Preparedness in Singapore

Singapore is one of the most densely populated urban cities in the world, with a population density of 7,540 persons per square kilometer; about 5.4 million people live and work within a land

area approximately 3.5 times the size of Washington, DC.[6] Like any major urban city, Singapore experiences its fair share of residential household fires, with approximately 3,000 residential fires occurring in 2012 alone.[7] The severity of these fires ranges from small kitchen fires caused by residents who leave their cooking unattended to major fires that result in serious injury, loss of life, and major damage to property. As 94.5 percent of Singaporean households live in high-rise apartment buildings, there remains a persistent risk that even small fires could spiral out of control. Reducing the number of residential fires and inculcating in the civilian population an awareness of fire safety therefore rank highly among the SCDF's priorities.

Generally, a civilian population that has cultivated an appreciation for the importance of emergency preparedness and received training on how to react during an emergency situation is less vulnerable and more resilient when faced with emergencies. Emergencies encompass fire related hazards, natural disasters, and other types of life-threatening scenarios. In the case of fires, people who have received emergency training are more likely to take action to minimize their susceptibility to fires, such as fireproofing their home and maintaining a portable fire extinguisher. They are also better prepared to react quickly and decisively during an actual fire, therefore increasing their odds of survival and minimizing the impact of the fire. Moreover, there are positive externalities that arise from training citizens to deal with emergencies — citizens who are equipped with emergency preparedness skills, such as knowing how to operate a fire extinguisher or perform basic first aid, could render assistance to their neighbors and fellow citizens before first responders arrive, possibly saving lives.[8] The Ministry of Home Affairs (MHA) and the Singapore Civil Defence Force (SCDF) therefore endeavor to raise the overall level of emergency preparedness among Singapore residents.

[6]For information on Washington, DC, see http://quickfacts.census.gov/qfd/states/11000.html. For the 2013 figures on Singapore's population density, see http://www.singstat.gov.sg/statistics/latest_data.html.

[7]See Seehttp://data.gov.sg/common/search.aspx?q=fire&s=default&cs=1&page=1.

[8]See the following newspaper articles for examples: http://www.tnp.sg/news/quick-thinking-workers-save-restaurant and http://www.tnp.sg/news/if-not-him-i-would-have-died.

Public engagement campaigns comprise the main thrust of the Singapore government's efforts to persuade and educate citizens about the importance of emergency preparedness. These include both passive appeals and active community engagement efforts. Government agencies and political leaders issue press releases on emergency preparedness[9]; the local news media occasionally run feature articles on citizens putting their emergency training to good use[10]; politicians promote emergency preparedness initiatives that they have launched on social media.[11] The SCDF also actively outreaches to schools and companies, partnering with them to organize workshops for their students and employees.[12]

3.2.1 The Community Emergency Preparedness Program

Launched in September 2003, the Community Emergency Preparedness Program (CEPP) is a full day, "instructional, face-to-face public education program" offered free-of-charge by the SCDF at designated fire stations throughout the year. All residents of Singapore are eligible to participate. The CEPP aims to equip participants with the skills to deal effectively with emergency situations when they arise, while waiting for first responders to arrive. It comprises five modules: basic first aid, one-man cardio-pulmonary resuscitation (CPR) and automated external defibrillator (AED), fire safety and casualty evacuation, emergency procedures, and terrorism.[13] Each module is designed to impart theoretical knowledge and provide practical training. Participants have the flexibility to complete the five modules in a single day, or over several days. They receive the

[9] http://www.channelnewsasia.com/news/specialreports/parliament/news/emergency-preparedness-pl/251108.html

[10] http://www.tnp.sg/news/passers-rescue

[11] See Singapore Prime Minister Lee Hsien Loongs Facebook Page for pictures of the Emergency Preparedness Exercise at Hougang Street 92: https://www.facebook.com/media/set/?set=a.745505925512116.1073741983.125845680811480&type=1

[12] http://m.hometeam.sg/article.aspx?news_sid=201307119KhQc286aXUK

[13] For detailed information on the CEPP training and access to the course notes, please visit the following website: http://www.scdf.gov.sg/content/scdf_internet/en/community-and-volunteers/community-preparedness/community-programmes/cepp.html.

course notes and a certificate of attendance upon completion of all 5 CEPP modules.

Despite the SCDF's best efforts to engage the public on emergency preparedness issues, overall levels of emergency preparedness and public enrollment in the CEPP remain low. For example, the 2010 SCDF Public Perception Survey found that only 23 percent of sampled residential households maintain a fire extinguisher at home; only 5 percent of sampled residential households have installed smoke detectors at home. Most CEPP participants are solicited from organized groups such as schools and companies; only a handful comprise members of the public who attend as walk-ins.[14]

Several factors could account for the aforementioned gap between the public's attitudes and behaviors toward emergency preparedness, though it is not within the scope of this study to discuss them in detail. That said, lack of issue salience and high initial investment costs arguably rank as important factors. Singapore has no natural disasters and has one of the lowest crime rates in the world (Singh 2000). The government is widely regarded as extremely efficient and its emergency services enjoy a high degree of confidence from the public. The absence of natural disasters, extremely low frequency of experienced emergencies, and a trusted and efficient emergency service collectively lead people to heavily discount the likelihood of residential fires occurring to themselves or their loved ones.[15] Many Singaporean residents therefore do not consider emergency preparedness training to be a salient part of their everyday lives. Moreover, attending the CEPP requires costly time investment — the average working adult would have to set aside a full day on a weekend to attend the CEPP. Consequently, to the average person, participating in the CEPP means making a costly time investment upfront, in exchange for what he deems as benefits that

[14]MHA briefing, dated July 24, 2014.

[15]The tendency to evaluate the probability of events by the ease with which they come to mind (e.g., from personal experience, or recall from a newspaper article that one has read) is known as the availability heuristic. See Tversky and Kahneman (1973, 1974), Schwarz et al. (1991), and Kahneman (2003*a*). Hertwig et al. (2004) argue that people who make decisions based on personal experience tend to make riskier choices because they underweight the probability of rare events occurring.

would occur for an extremely low probability event in the future. Most people would therefore choose not to participate in the CEPP.

3.2.2 The Post-Fire Blitz Campaign

The post-fire blitz is a community engagement effort undertaken by the SCDF in the immediate aftermath of a significant residential fire occurring within an apartment building.[16] It aims to inform residents about the fire and share with them fire safety tips. It comprises an onsite information exhibit held at the lobby of the apartment building and a door-to-door visit of all households by SCDF officers and a civilian team comprising grassroots emergency response volunteers. The blitz provides SCDF officers and grassroots volunteers with the opportunity to interact and build rapport with residents, increase their awareness about fire hazards, and interest them in learning more about fire safety procedures. Note that prior to the experiment, the SCDF had yet to leverage the post-fire blitz platform to advertise the CEPP to residential households; it had not explicitly linked its messaging in the post-fire blitz with attendance at the CEPP.

The SCDF selected the post-fire blitz campaign as the platform to increase CEPP attendance, for two reasons. First, the recency and severity of the apartment building fire imply that fire safety would still weigh heavily on residents' minds; it would become a salient issue, albeit temporarily. From a policy perspective, leveraging the SCDF's post-fire blitz campaign to encourage attendance at the CEPP means engaging with a more receptive pool of residents, relative to other contexts where fire is not a salient issue. Even without the behavioral modifications to the post-fire blitz, we would expect a pure appeal to attend the CEPP to yield a greater proportion of CEPP attendees. From a research design perspective, the post-fire blitz represents a "hard test case" (George and Bennett 2005) for evaluating the behavioral modifications. Because of high issue salience,

[16]The SCDF categorizes fires as significant if they involve injuries or deaths, or cause significant alarm to residents. Note that the SCDF only conducts post-fire blitzes for significant fires.

we would expect the baseline rate of CEPP interest and attendance to be higher in the post-fire blitz control group, relative to the control group baseline rates in other contexts with lower issue salience. This suggests that the average treatment effect of the behavioral modifications on CEPP interest and attendance would be smaller in the post-fire blitz.

Second, the proposed behavioral modifications to the post-fire blitz could easily be adopted across all future post-fire blitzes in Singapore, should they prove effective in increasing CEPP attendance rates among residential households in our study. In our opinion, the findings from applied research in the field setting should ideally translate into real world, policy-relevant implications of the form: "research establishes these findings, so this is what the next iteration of our policy should look like". Evaluating the effects of the behavioral modifications in the lab might lead us to the same conclusions, but the immediate applicability to policymakers is less obvious. The post-fire blitz represents an ongoing community engagement effort by the SCDF, so it serves as a natural platform for pilot testing the effects of the aforementioned behavioral modifications.

3.3 Theory: Designing Public Engagement Campaigns To Change Behavior

Successful public engagement campaigns change how people think and behave. The proposed behavioral modifications to the post-fire blitz must therefore go beyond merely eliciting interest to attend the CEPP; they must also increase CEPP attendance rates. To achieve those objectives, the SCDF selected a combination of *contextual frames* and *follow-through prompts*. All residents first received a contextual frame that highlighted how they would benefit from attending the CEPP (getting people to say yes). They were then asked if they would be interested to attend the CEPP. Finally, interested residents received a follow-through prompt nudging them to attend the CEPP

(getting those who say yes to take action).

Public opinion scholars have demonstrated that subtle variations in how information is framed can lead to large changes in attitudes and knowledge about an issue.[17] Frames serve as a "central organizing idea for making sense of relevant events and suggesting what is at issue" (Gamson and Modigliani 1989); they "select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described" (Entman 1993).[18]

The SCDF built on the aforementioned ideas and designed contextual frames to help residents make sense of the recent fire in their apartment building, so as to increase their interest in and attendance at the CEPP. Specifically, the contextual frames drew a link between knowledge of fire safety and likelihood of escaping fires unharmed, and made salient to residents how they would benefit from attending the CEPP. Self-interest frames emphasized how residents and their family would benefit from their attending the CEPP, whereas communitarian frames highlighted how their community would benefit. Note that the communitarian frame sought to simultaneously appeal to various motivations for prosocial behavior, such as *pure altruism* (deriving satisfaction from improving the welfare of others), *impure altruism* (deriving satisfaction from the act of helping, without concern for the recipients welfare), *social image* (the desire to maintain a reputation as a contributing member of society), and *self-image* (the desire to conform to ones identity as a contributing member to society).[19] To increase the effectiveness of the contextual frames, residents were also primed to think about the effects of the fire from either a self-interested or communitarian

[17] See Entman (1993) and Chong and Druckman (2007) for an overview of the framing effects literature. Benford and Snow (2000) reviews how message frames influence collective action movements.

[18] Quotations from Nelson, Oxley and Clawson (1997).

[19] For an overview of the prosocial behavior literature, see Benabou and Tirole (2003). See Andreoni, Harbaugh and Vesterlund (2007) and Becker (1974) for a more detailed exposition on pure altruism; Andreoni (1989) for impure altruism; Benabou and Tirole (2006) for self-image, and Ariely, Bracha and Meier (2009) for social image.

perspective. Residents who received the self-interest frame were asked to think about the actions they would take if a fire were to break out in their *own apartment* while they were at home with their family; residents who received the communitarian frame were asked to think about the actions they would take if a fire were to break out in their *neighbor's apartment* while they were at home with their family. See Appendix B-1 for more information.

Overall, we hypothesized that contextual frames would influence CEPP interest as follows:

(1) Residents who receive a contextual frame are more likely to express interest in attending the CEPP, relative to those who receive only an outright appeal (no contextual frame).

(2) Residents who receive a communitarian frame are more likely to express interest in attending the CEPP, relative to those who receive a self-interest frame.

Message frames could succeed in changing attitudes toward an issue but ultimately have a negligible effect on behaviors (Sheeran 2002; Bartels 2005; Sniehotta, Scholz and Schwarzer 2005). Several psychological and cognitive mechanisms account why people often fail to act on their intentions. Sometimes, prohibitive information search costs serve as a costly cognitive barrier that prevents people from taking actions that would benefit them in the longer term (Jones 2010).[20] People could also have time-inconsistent preferences — they overly discount the future and therefore agree to undertake costly actions in the future, but renege on that undertaking when the time comes because the action turns out to be costlier than they had anticipated (Ainslie 1975; Hoch and Loewenstein 1991; Loewenstein 1996; Laibson 1997). The absence of a firm deadline to compel people to take immediate action could also lead them to procrastinate (O'Donoghue and Rabin 1999*a*,*b*; Ariely and Wertenbroch 2002; Milkman, Rogers and Bazerman 2008), or they could

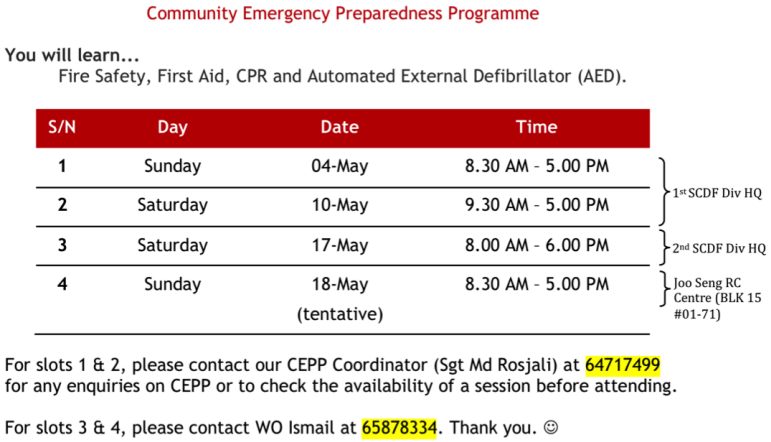
[20]Such cognitive constraints on rational decision-making have led to models of bounded rationality. See Simon (1955), Conlisk (1996) and Kahneman (2003*a*,*b*). For the canonical work on the role of information in decision-making, see Stigler (1961).

simply forget (Schachter 1999).

The SCDF designed follow-through prompts to further engage residents who had indicated an interest to attend the CEPP, with the aim of transforming their interest into actual attendance at the CEPP. The follow-through prompts were meant to be relatively costless interventions that would bridge the psychological and cognitive gaps between intentions and behavior.

The SCDF focused on two follow-through prompts: the *informational package* and the *preregistration package*. The informational package comprised a printed schedule on upcoming CEPP sessions and a map with directions to the CEPP. See Figures 3.1 and 3.2 below. In theory, the information package would eliminate the costs of information acquisition — having to search for information on the CEPP online — because it contained all the relevant information that residents would need to make a plan to attend a future CEPP session. This in turn would allow residents to focus their limited attention on analyzing the new information on the importance of fire safety presented in the contextual frames.[21] However, the provision of information often does not change behavior (Thaler and Sunstein 2008).

Figure 3.1: *Information Package: Printed Map With Directions to CEPP Locations*



Community Emergency Preparedness Programme

You will learn...
Fire Safety, First Aid, CPR and Automated External Defibrillator (AED).

S/N	Day	Date	Time	
1	Sunday	04-May	8.30 AM - 5.00 PM	1st SCDF Div HQ
2	Saturday	10-May	9.30 AM - 5.00 PM	
3	Saturday	17-May	8.00 AM - 6.00 PM	2nd SCDF Div HQ
4	Sunday	18-May (tentative)	8.30 AM - 5.00 PM	Joo Seng RC Centre (BLK 15 #01-71)

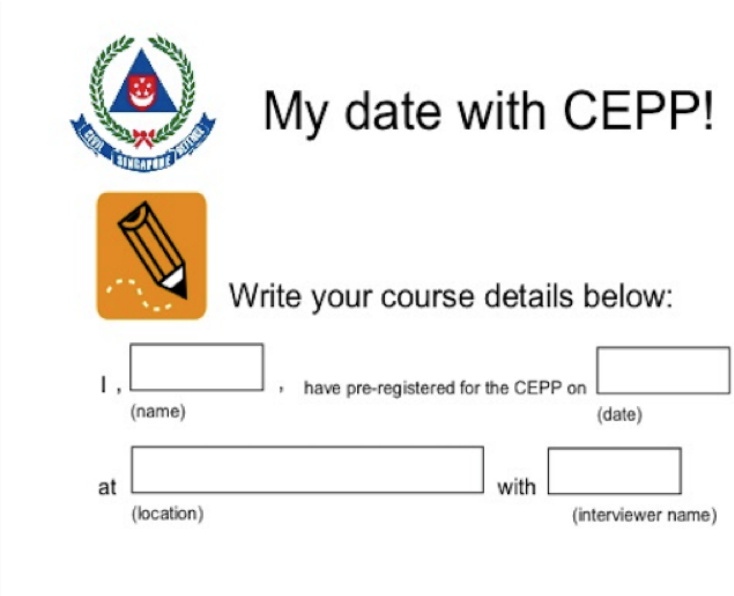
For slots 1 & 2, please contact our CEPP Coordinator (Sgt Md Rosjali) at 64717499 for any enquiries on CEPP or to check the availability of a session before attending.

For slots 3 & 4, please contact WO Ismail at 65878334. Thank you. ☺

[21] For experimental evidence of how people acquire and process information, see Gabaix et al. (2006).

Figure 3.2: *Information Package: Printed Information Schedule on Upcoming CEPP Sessions*

Figure 3.3: *Appointment Postcard Provided to Respondents Who Preregistered for the CEPP*



By contrast, the preregistration package comprised the informational package, a prompt to preregister to attend the CEPP, an appointment postcard, and a notification that they might be contacted by the SCDF to share their feedback on the CEPP. See Figure 3.3 above.

The preregistration package combined several behavioral interventions — making a concrete plan (Sniehotta, Scholz and Schwarzer 2005; Rogers et al. 2011; Milkman et al. 2012), commitment mechanisms (Thaler and Shefrin 1981; Schelling 1984, 1992; Burn and Oskamp 1986; Wertenbroch 1998), and reminder prompts (Milkman et al. 2011; Vervloet et al. 2012) — to nudge interested residents to attend the CEPP. When interested residents were presented with the schedule of upcoming CEPP sessions and asked to preregister, they were compelled to mentally search for a time-slot that would best fit their schedules. Next, they had to make a verbal commitment to attend the CEPP. They then received an appointment postcard affirming the plan that they have committed to. The postcard served as a visual reminder of their personal plan and commitment to

attend the CEPP. Finally, the possibility of being contacted by the SCDF in the future entrenched that commitment by holding residents accountable to their promise to take action. Note that these interventions match the following recommendations for increasing the potency of plan-making, a type of follow-through prompt (Rogers et al. 2011): the recipient has indicated an intention to accomplish a goal; a concrete plan; public declaration of the plan; the planning process requires the recipient to mentally walk-through how to overcome obstacles to accomplishing the goal; limited time window to act.

Overall, we hypothesized that follow-through prompts would influence CEPP interest as follows:

> (3) Residents who receive an informational package are more likely to attend the CEPP, relative to those who receive no follow-through prompt.
>
> (4) Residents who receive a preregistration package are more likely to attend the CEPP, relative to those who receive no follow-through prompt.

Note that the sequencing of the behavioral modifications mattered from both theoretical and practical standpoints. Theoretically, designing effective message frames to influence attitudes is important because intent is a crucial prerequisite for behavioral change (Azjen and Fishbein 1980; Abraham and Sheeran 2000; Wallston and Armstrong 2002); people must first internalize the message frame before deciding to take action (Rothman and Salovey 1997). The first step would therefore involve persuading residents of the need to attend the CEPP. People, however, often fail to act on their intentions, so the subsequent step would involve nudging interested residents to follow-through on their intentions. Practically, it made sense to administer the follow-through prompts only on residents who had indicated an interest to attend the CEPP — the follow-through prompts were designed to bridge the gap between intentions and behavior, so residents who remained unconvinced on the need to attend the CEPP would have found them redundant.

3.4 Experimental Design

This section motivates the experimental design, which sought to evaluate whether behavioral modifications to the SCDFs post-fire blitz campaign — in the form of *contextual framing* and *follow-through prompts* — could increase interest in and attendance rates at the CEPP. We first detail the experimental design and treatments. We then present the experimental timeline.

3.4.1 Experimental Design: Random Assignment to Treatments

The ideal experimental design would comprise a sequential randomization. All residents would first be randomly assigned to either a study or control group. The control group would receive only an outright appeal to attend the CEPP. All residents assigned to the study group would receive either a self-interest frame or communitarian frame. They would then be asked if they would be interested to attend the CEPP. Those who were interested to attend the CEPP would then be randomly assigned to receive either an informational package or preregistration package, whereas those who were uninterested to attend the CEPP would receive no follow-through prompt. The SCDF would track the attendance of all residents for up to a month after the experiment. Figure 3.4 below summarizes.

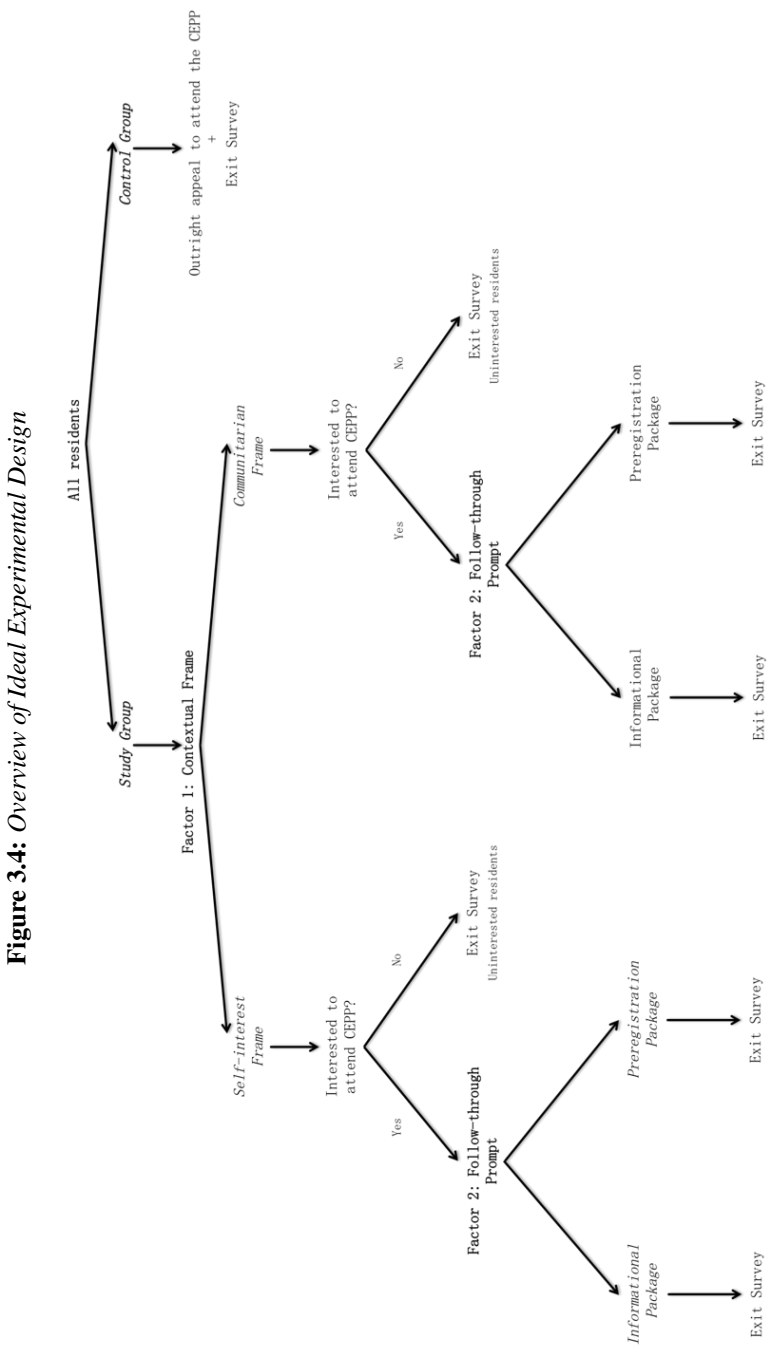


Figure 3.4: *Overview of Ideal Experimental Design*

It is important to note that such an experimental design is akin to conducting two separate experiments on different subsets of residents. The first experiment would examine the effect of contextual frames on CEPP interest and attendance, on *all* residents. The second experiment would examine the effect of follow-through prompts on CEPP attendance, on the *subset* of residents who had indicated interest to attend the CEPP. The residents who were interested to attend the CEPP had essentially self-selected into the second experiment, so they might differ in some characteristics from residents who were uninterested to attend the CEPP. To the extent that these differing characteristics influence attendance at the CEPP, then comparing follow-through prompt recipients (who were interested to attend the CEPP) with control group residents and residents who were uninterested to attend the CEPP would produce biased estimates of the causal effect of the follow-through prompts. In the subsequent section, we define the comparison groups in our empirical evaluation of the follow-through prompts, and discuss the generalizability of the findings beyond the current experiment.

In practice, the SCDF was unable to implement the ideal experimental design because they lacked the resources and know-how to perform on the spot randomization of residents to the follow-through prompts; it would be impossible to randomly assign residents to receive the follow-through prompts prior to the post-fire blitz because the SCDF did not know ex-ante which residents would be interested to attend the CEPP. Instead, the SCDF assumed that all residents were of the same type — interested to attend the CEPP — and adopted a 2 X 2 factorial design (Factor 1: Contextual Frame — self-interest vs. communitarian; Factor 2: Follow-through Prompt — informational package vs. preregistration package).[22] The various factor combinations yielded four treatment groups: Treatment Group 1 was assigned to receive the self-interest frame and informational package; Treatment Group 2 was assigned to receive the self-interest frame and preregistration package;

[22]See Fisher (1935), Friedman and Sunder (1994), and Box, Hunter and Hunter (2005) for more information on factorial designs.

Treatment Group 3 was assigned to receive the communitarian frame and informational package; Treatment Group 4 was assigned to receive the communitarian frame and preregistration package. The control group was assigned to receive only an outright appeal to participate in the CEPP, with no contextual frame or follow-up prompt. Table 3.1 below summarizes.

Table 3.1: *The 2 X 2 Factorial Design*

Treatment Combinations in the 2 X 2 Factorial Design		
Treatment Groups	**Factor 1: Contextual Framing**	**Factor 2: Engagement Prompt**
1	Self-Interested	Info on CEPP
2	Self-Interested	Info on CEPP + Preregister
3	Communitarian	Info on CEPP
4	Communitarian	Info on CEPP + Preregister
Control	No contextual frame	No information

The SCDF implemented a cluster-randomized design with the residential floor as the unit of randomization.[23] They randomly assigned residential floors within each post-fire blitz apartment building to either one of the four treatments or control, so that all households within the same residential floor received the same treatment assignment.[24] This approach to randomization meant that the SCDF officers were aware of the treatment protocol they had to deliver to residents, prior to commencing the post-fire blitz. They would administer the follow-through prompts to residents interested to attend the CEPP, but withhold delivery of the follow-through prompts if residents were uninterested to attend the CEPP. Figure 3.5 below summarizes.

[23] See Donner and Klar (2004) and Green and Vavreck (2008). Some economists refer to cluster randomized designs as group randomized trials. See Moulton (1986), Angrist and Lavy (2009), Angrist, Lang and Oreopoulos (2009).

[24] If a particular apartment block has ten floors, then the treatment groups and the control would each receive two floors worth of residential households. If the number of residential floors within the apartment block is not a multiple of 5, then we implement a completely randomized design for the number of floors equivalent to the largest multiple of 5 possible, and adopt a Bernoulli randomization (p=0.2) for the additional floors.

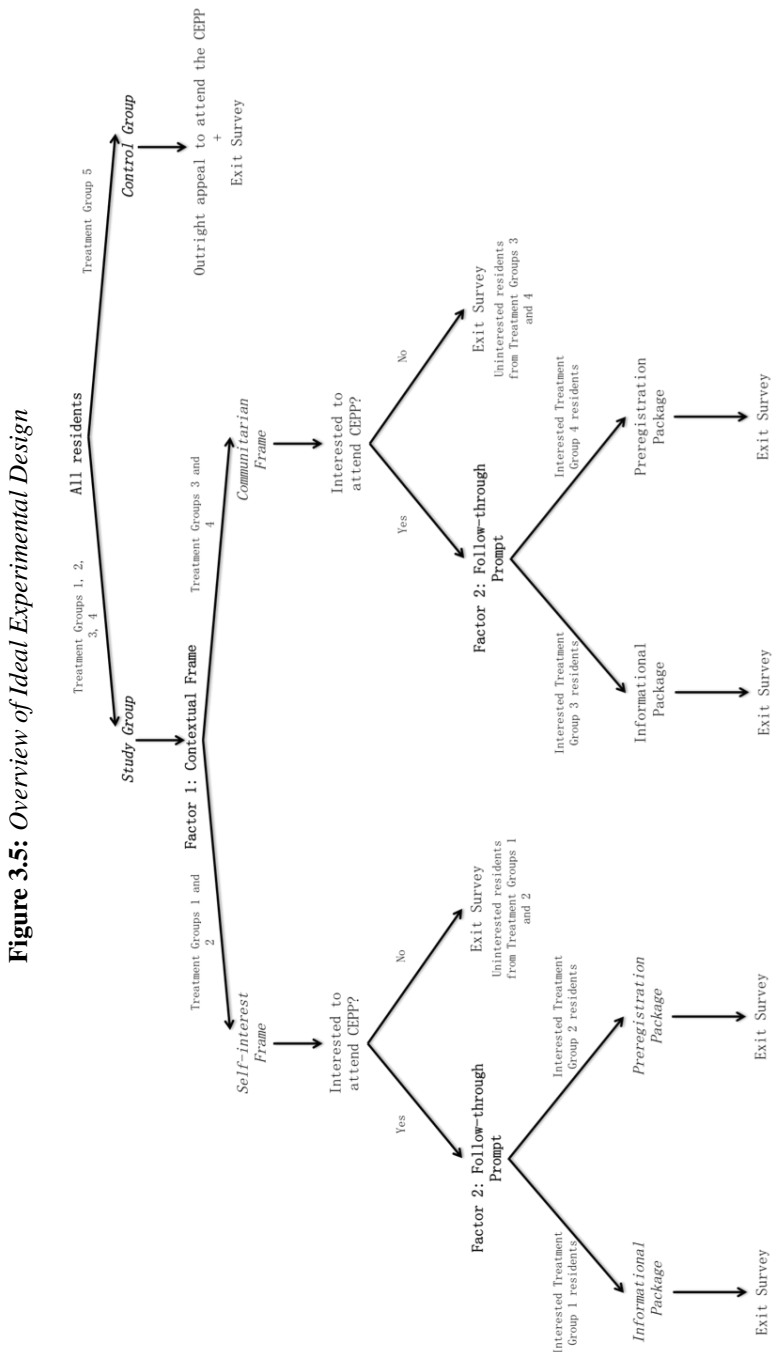


Figure 3.5: *Overview of Ideal Experimental Design*

Randomizing by residential floor, rather than households, made sense for design reasons. Residents living in a particular apartment building were more likely to share similar demographic characteristics, compared to residents living in different apartment buildings. Randomizing at either the individual-level or residential floor-level would allow the SCDF to account for possible within-block homogeneity by including residents from the same building across all the treatment and control groups, thereby improving balance in both observable and unobservable characteristics across the treatment and control groups in expectation. Cluster randomization, however, better ensured that the Stable Unit Treatment Value Assumptions (SUTVA) of non-interference and no-hidden variation in treatment were satisfied.[25] Non-interference could occur when experimental units that received different treatments interact with each other. In our case, contamination might take place because residents could discuss the specifics of the SCDFs communications during the post-fire blitz with each other, which would in turn influence the potential outcomes associated with the treatment assignments, and hence the estimates of the average treatment effect.[26] Residents living next to each other were more likely to interact with each other, compared to residents living on different floors. Randomization at the residential-floor level therefore minimized the possibility of contamination.

Additionally, violations to the no-hidden variation in treatment assumption generally occur when administering the treatment. Slight variations in treatment delivery effectively change the number of treatment groups in the study, which in turn influences the definition of the causal estimand of interest. Randomizing by floors would reduce confusion among the SCDF officers who deliver the treatment protocols, since they would deliver the same treatment to several apartment

[25] SUTVA is part of the Rubin Causal Model and is necessary for making valid causal inferences in a randomized experiment. See Holland (1986) and Rubin (1974, 2005).

[26] For example, a resident who received the communitarian contextual frame and was preregistered for the CEPP could meet with a resident assigned to the control group and share with him information on the upcoming CEPP sessions. The resident assigned to the control group then decides to participate in the CEPP together with his neighbor. The proportion of CEPP attendees in the control group rises and the estimated treatment effect falls.

units on each floor, rather than having to vary the treatments for each apartment unit.[27]

3.4.2 Experimental Timeline

Table 3.2 below outlines the experimental timeline, which was divided into the pre-blitz phase, during blitz phase, and post-blitz phase.

The pre-blitz phase began when a major fire broke out at a residential apartment building. The SCDF assigned a team of officers to prepare for a post-fire blitz at the affected apartment building. At this stage, residential floors in the apartment building were assigned to one of the four treatment groups or control group.

The during blitz phase commenced on the day of the post-fire blitz. SCDF officers began by informing residents of the recent fire. The SCDF officers then administered the contextual frames. Next, residents were asked whether they would be interested to attend the CEPP. Finally, the SCDF officers administered the follow-though prompt treatments to residents who had indicated their interest to attend the CEPP. Residents who were uninterested to attend the CEPP did not receive a follow-through prompt. All respondents were asked to complete a brief survey to collect demographic information and their attitudes toward emergency preparedness.[28] See Appendix B-2 for a description of the data collected.

In the post-blitz phase, the SCDF tracked attendance at the CEPP for up to a month after the post-fire blitz. We assumed that respondents who did not turn up for the CEPP within the one-

[27]To ensure that the SCDF officers assigned to the post-fire blitz implement the treatments consistently, the Ministry of Home Affairs conducted two training sessions, during which they practiced delivering the treatments to each other. The SCDF officers also rehearse their delivery of the treatments prior to beginning the door-to-door visits at the affected apartment blocks.

[28]In theory, randomization ensures that the treatment and control groups are, on average, similar across both observable and unobservable characteristics. However, there still exists the possibility that the particular randomizations we have drawn for our experiment result in treatment and control groups that differ on some characteristics. SCDF therefore conducted a brief face-to-face survey at the end of the experiment to collect background covariates that might affect the outcomes of interest. These background covariates allow us to check that randomization was properly implemented, and to allow us to use statistical adjustment if covariates were imbalanced.

month window were unlikely to do so subsequently.

Table 3.2: *The Experimental Timeline*

Phase	Steps
Pre-blitz	1. Major fire breaks out in residential apartment 2. Households in affected residential apartment building assigned to treatments prior to post-fire blitz
During blitz	1. SCDF informs residents of fire 2. Administering of contextual framing treatments 3. Respondents asked if they would be interested to attend the CEPP 4. Administering of planning/commitment/ reminder treatments 5. Face-to-face survey to collect background covariates
Post-blitz	1. SCDF tracks respondents' attendance at the CEPP 2. Tracking ends one month after the post-fire blitz

3.5 The Experimental Data

This section describes the experimental data from four post-fire blitzes that were held between January and April of 2014. We begin with an overview of the data. We then evaluate whether randomization achieved balance in observed covariates across the treatment and control groups of interest.

3.5.1 Overview of Data

Four major residential fires occurred between Jan 2014 and April 2014 at apartment blocks in the Houngang, Compassvale, Choa Chu Kang, and Pinnacle districts. The SCDF conducted a total of four post-fire blitzes and interviewed a total of 268 residents living on 88 residential floors. The outcomes of interest were CEPP interest and CEPP attendance. Approximately 20 percent of the residents were assigned to each of the five treatment groups, which suggest that the randomization was properly implemented.[29] Table 3.3 below summarizes.

Table 3.3: *Randomization Across Treatment Groups*

Treatment Group	Block 1: Hougang	Block 2: Compassvale	Block 3: Choa Chu Kang	Block 4: Pinnacle	Subtotal	% of total respondents
1	16	13	13	15	57	0.21
2	11	15	14	14	54	0.20
3	13	11	10	17	51	0.19
4	19	9	9	15	52	0.19
Control	12	12	11	19	54	0.20
Total	71	60	57	80	268	

Several demographic characteristics of the post-fire blitz respondents differed from those of the national population's. Post-fire blitz respondents were on average older and more educated, more

[29]The numbers of respondents assigned to each treatment group are not exact because some respondents were not home when the interviewers visited. SCDF revisited these households a second time, and if they were still not home, they were excluded from the analysis.

likely to be male, and had larger households. For the post-fire blitz sample, 55.6 percent were male and 83.9 percent were Singaporean citizens; the median age was 40.3 and the average household size was 4.25; Chinese comprised 70.9 percent, Malays 9 percent, Indians 14.9 percent, and other races 5.2 percent; 86.19 percent had received a secondary education or higher, and 98.5 percent of residents lived in a 3-room/4-room/5-room flat. By contrast, in the national population, 49.2 percent were male and 86.2 percent were Singaporean citizens; the median age was 38.9 and the average household size was 3.47; Chinese comprised 74.2 percent, Malays 13.3 percent, Indians 9.2 percent, and other races 3.3 percent; 68.8 percent had received a secondary education or higher, and 92.9 percent of residents lived in a 3-room/4-room/5-room flat. Table 3.4 below summarizes.

Table 3.4: *Comparison of Demographic Profile of Post-Fire Blitz Sample and National Population*

Characteristic	Post-fire blitz sample	National Population
Male	55.6	49.2
Singapore citizen	83.9	86.2
Age	40.3	38.9
Household size	4.25	3.47
Chinese	70.9	74.2
Malay	9	13.3
Indian	14.9	9.2
Other	5.2	3.3
Secondary education	86.19	68.8
3/4/5 room flat	98.5	92.9

Note that the post-fire blitz sample's lack of representativeness did not concern us. Our main objective was to examine how the SCDF could leverage behavioral nudges to increase CEPP attendance, so what mattered more was that the findings generalized to the population of major fire-prone apartment buildings. If anything, if there were indeed systematic differences in demographic characteristics between apartment blocks with major fires and apartment blocks without major fires or no fires, then policy interventions targeted at residents from "at risk" apartment

blocks would arguably yield greater overall impact.

3.5.2 Evaluating Covariate Balance Across Treatment and Control Groups

In theory, randomization would ensure that the treatment and control groups were, on average, similar across both observable and unobservable characteristics. However, there still existed the possibility that the particular randomizations drawn for the experiment would result in imbalanced treatment and control groups. The SCDF therefore conducted a brief face-to-face exit survey to collect information on residents' demographics and attitudes toward emergency preparedness, as these might influence the outcomes of interest. These background covariates would allow us to check whether randomization achieved balance across the treatment and control groups, and to use statistical adjustment when estimating the causal effects of interest if balance were not achieved. See Appendix B-2 for a description of the dataset.

We had noted in Section 4.1 that the experimental design was akin to conducting two separate experiments on different subsets of residents. The first experiment examined the effect of contextual frames on CEPP interest and attendance, on *all* residents. The second experiment examined the effect of follow-through prompts on CEPP attendance, on the *subset* of residents who had indicated interest to attend the CEPP. Consequently, the relevant treatment and control groups would differ when evaluating the effect of contextual frames and follow-through prompts. For estimating the causal effect of contextual frames, we focused on the self-interest treatment group (all residents in Treatment Groups 1 and 2), the communitarian treatment group (all residents in Treatment Groups 3 and 4), and the control group (all residents in Treatment Group 5). By contrast, for estimating the causal effect of follow-through prompts, we focused on the informational treatment group (the subset of residents in Treatment Groups 1 and 3 who were interested to attend the CEPP), the preregistration treatment group (the subset of residents in Treatment Groups 2 and 4 who were

interested to attend the CEPP), and the control group (all residents in Treatment Group 5). Table 3.5 below summarizes.

Table 3.5: *Overview of Treatment and Control Groups*

Contextual Frame	**Self-interest Group**	**Communitarian Group**	**Control Group**
	All residents in Treatment Groups 1 and 2	All residents in Treatment Groups 3 and 4	All residents in Treatment Group 5
Follow-through Prompt	**Informational Group**	**Preregistration Group**	**Control Group**
	Subset of residents in Treatment Groups 1 and 3 who were interested to attend CEPP	Subset of residents in Treatment Groups 2 and 4 who were interested to attend CEPP	All residents in Treatment Group 5

To verify that randomization had successfully achieved balance across the treatment and control groups, we implemented both univariate and multivariate balance diagnostics. The univariate balance diagnostics comprised a difference-in-means and corresponding two-sample t-test with unequal variances, and a two-sample Kolmogorov-Smirnov (KS) test.[30] We considered a covariate imbalanced if the p-values from both the two-sample t-test and KS test were significant at the 5 percent level. The multivariate balance check comprised a regression of a trichotomous treatment variable that indicates assignment to one of the three treatment groups (e.g., control group/self-interest frame/communitarian frame) on the demographic and emergency preparedness covariates. We considered the covariates to be imbalanced if they were jointly significant in predicting the trichotomous treatment variable.

Overall, the balance diagnostics suggest that randomization achieved experimental balance across all the relevant groupings of interest: (1) self-interest treatment group vs. control group, (2) communitarian treatment group vs. control group; (3) informational treatment group vs. control group; (4) preregistration treatment group vs. control group. See Appendix B-3.

[30]See Mao and Vreeland (2012, 2013) for an example on reporting balance diagnostics.

3.6 Evaluation Strategy

In this section, we discuss our strategy for estimating the causal effect of: (1) contextual frames on CEPP interest and CEPP attendance, and (2) follow-through prompts on CEPP attendance. We begin with a discussion on one-sided noncompliance among residents assigned to receive the preregistration package treatment. Next, we describe our approach to estimating causal effects of interest under cluster randomization. Finally, we outline the overall strategy for estimating the causal effects of interest.

3.6.1 One-Sided Noncompliance

Noncompliance occurs when a subset of residents fail to comply with their treatment assignment, and instead receive an alternative treatment.[31] There are three noncomplier types: (1) never-takers who avoid taking their assigned treatment, no matter which treatment they are assigned to; (2) always-takers who take the assigned treatment, no matter which treatment they are assigned to; (3) defiers who do the opposite of their treatment assignment.

One-sided noncompliance occurs when a subset of residents that are assigned to receive the treatment receive the control instead; all residents assigned to the control comply with their treatment assignment. Such a scenario could occur because the experimenters exercise control over which residents obtain access to the control, but have to rely on the willingness of respondents to take up the treatment. During the experiment, the SCDF encountered one-sided noncompliance among the residents assigned to receive the preregistration package: only 71.8 percent of them agreed to preregister for the CEPP. All other residents complied with their treatment assignments. Table 3.6 below summarizes.

[31] See Angrist, Imbens and Rubin (1996) for an overview of the framework for causal inference under a scenario of binary treatment assignment ignorability but imperfect compliance (treatment receipt ignorability).

Table 3.6: *One-Sided Noncompliance Among Residents Assigned to Receive the Preregistration Package*

	Interested to Attend CEPP and Preregistered (%)
Preregistration (Treatment Groups 2 and 4)	71.83
Treatment Group 2	80.56
Treatment Group 4	62.86
Control Group	0

In the analyses that follow, we estimate both the intent-to-treat (ITT) effect and the complier average treatment effect (CATE). The ITT measures the effect of being assigned to the preregistration package on CEPP attendance, without regard for whether residents actually preregistered. The CATE measures the effect of actually preregistering for the CEPP on CEPP attendance. The ITT is arguably of greater interest to policymakers as they can determine whether to include preregistration in their future community engagement efforts, but cannot compel target recipients to actually go through with the preregistration process. The ITT therefore provides a lower bound estimate of the expected impact on CEPP attendance rates, should the SCDF decide to implement the planning/commitment/reminder prompt across all future post-fire blitzes. Note that estimating the ITT does not require us to make further assumptions beyond the SUTVA assumptions referred to in Section 3.4.

By contrast, the CATE is arguably of greater interest to academics because it measures the effect of actually preregistering on CEPP attendance. Following the Angrist, Imbens and Rubin (1996) framework, we assume monotonicity to exclude the subpopulation of defiers. This seems reasonable because there is no obvious reason that there would be defiers within the context of our study, i.e., respondents who would insist on preregistering upon receiving information on upcoming CEPP sessions. Further, we assume the exclusion restrictions hold for the subpopulation of always-takers and never-takers — receiving the pre-registration prompt has no effect on the poten-

tial outcomes, i.e., attending the CEPP. Along with the SUTVA assumptions outlined in Section 3.4, we can then therefore use the instrumental variables estimand to estimate the CATE.

To the extent that the noncompliers resemble the compliers, then the CATE serves as an upper bound of the ITT — the ITT equals the CATE when all those who are assigned to the preregistration package treatment comply with the preregistration request. Though the SCDF officers cannot force residents to preregister for the CEPP, there are techniques that they can adopt during the face-to-face interview to improve the compliance rate with the preregistration request. We return to this discussion in the conclusion section. Note that estimating the CATE requires us to assume several exclusion restrictions.

Following Imbens and Rubin (2015), we did not implement *per protocol* analysis and *as treated* analysis, because they generally produce biased estimates of the causal effects of interest. Per protocol analysis involves discarding units that fail to comply with their treatment assignment, and then analyzing the remaining data as if they were generated from a randomized experiment with perfect compliance. For our study, this means discarding those residents who were assigned the preregistration package treatment but who refused to preregister (the noncompliers). The relevant estimand of interest would be the CATE. However, since we cannot observe the compliance type for residents assigned to the control group, we cannot discard the noncomplier types among the control group residents. The per protocol estimator effectively compares the compliers assigned to the treatment with both compliers and noncompliers assigned to the control, and therefore produces biased estimates of the CATE (Imbens and Rubin 2015).

As treated analysis involves analyzing the data as if the treatments that residents actually received were the treatments that they were assigned to. In our case, this means re-categorizing the preregistration noncompliers — who effectively received the control treatment — as part of the control group. The relevant estimand of interest would be the average treatment effect (ATE). The

receipt of treatment, however, is non-randomly assigned as the noncompliers had self-selected into the control group. If the expected difference in outcomes between the compliers and noncompliers in the control group were different, then the as treated estimator would produce biased estimates of the ATE.

3.6.2 Cluster Randomization and Causal Inference

Cluster randomization complicates causal inference because units within the same cluster could share common "disturbances" (Green and Vavreck 2008). The presence of such intracluster correlation implies that standard errors estimated from Ordinary Least Squares (OLS) regression would be downward biased, therefore increasing the likelihood of finding significant treatment effects when none exist (Murray 1998). As aptly noted by Cornfield (1978), "analyses of group randomized trials that ignore cluster are an exercise in self-deception".

There exist two approaches to account for the intracluster correlation brought about from cluster randomization at the residential floor level, each with its pros and cons.

First, we could aggregate the data at the residential floor level and treat each residential floor as an observational unit. Averaging across individuals within each residential floor eliminates intracluster variation, but causes the effective sample size to shrink from $n_C * C$ units to C units, where n_C denotes the number of observations in cluster c and C the number of clusters.[32] The smaller sample size reduces the efficiency of the treatment effect estimates, though the elimination of the intracluster correlation generally offsets the efficiency loss (Green and Vavreck 2008). Under this approach, the quantity of interest is the weighted-group treatment effect of the behavioral nudges on residential-floor level outcomes of interest. Individual-level covariates are excluded

[32]King et al. (2007) and Imai, King and Nall (2009*a*,*b*) propose using matched pairs in cluster randomized experiments to increase the power of a small n-design. The SCDF did not adopt this approach because they lacked background covariates of households in the post-fire blitz prior to treatment assignment.

from the analysis.

Second, we could preserve the individual-level structure of the data and attempt to correct for the intracluster correlation-induced downward bias in the standard errors. For example, we could obtain unbiased OLS estimates of the treatment effects and estimate robust cluster standard errors. Alternatively, we could directly model the intracluster correlations using a random effects logistic regression, which assumes that the cluster-level effects are drawn from a normal distribution with finite and constant variance. Under this approach, the quantity of interest is the average treatment effect of the behavioral modifications on individual-level outcomes of interest. We could also include individual-level covariates to improve the precision of the average treatment effect estimates.

For our purposes, we are ultimately interested in designing interventions to increase the individual's interest in and participation at the CEPP. We therefore favor making inferences at the individual-level, though we present findings using both aggregated and individual-level data.

3.6.3 Evaluation Strategy

We seek to evaluate the effect of contextual frames (self-interest and communitarian) on CEPP interest and CEPP attendance, and the effect of follow-through prompts (informational and preregistration) on CEPP attendance. For each evaluation, we first present the OLS point estimates of the average treatment effects, for both the individual-level and cluster aggregated data, using both standard and robust cluster standard errors. Note that for the evaluation of the preregistration follow-through prompt, we estimate both the intent-to-treat effect (ITT) and the complier average treatment effect (CATE). Next, covariate imbalance might affect the precision of the treatment effect point estimates. Additionally, to the extent that imbalance in observed covariates is correlated with imbalance in unobserved characteristics, then we would have biased treatment effect estimates due to confoundedness of the unobserved characteristics with potential outcomes. We

therefore include demographic and emergency preparedness covariates, as well as apartment block fixed effects in the OLS regressions.

3.7 Experimental Findings

In this section, we present the experimental findings. We first present the effect of contextual frames on CEPP interest and CEPP attendance. Next, we present the effect of the follow-through prompts on CEPP attendance. Finally, we examine interaction effects — did the effect of the follow-through prompts vary depending on the contextual frame previously received?

3.7.1 Did Contextual Frames Increase CEPP Interest?

Contextual frames were significantly more effective in increasing residents' interest to attend the CEPP, compared to an outright appeal. Specifically, including a contextual frame increased the percentage of residents who were interested to attend the CEPP by 72 percent (40.7 percent in the control group vs. 70 percent in the contextual frame treatment groups, a difference of 29.4 percent). The communitarian frame (72.8 percent) was marginally more effective than the self-interest frame (67.6 percent) in increasing CEPP interest, though this difference was statistically insignificant. Figure 3.6 below summarizes.

Figure 3.6: *CEPP Interest Across Contextual Framing Groups*

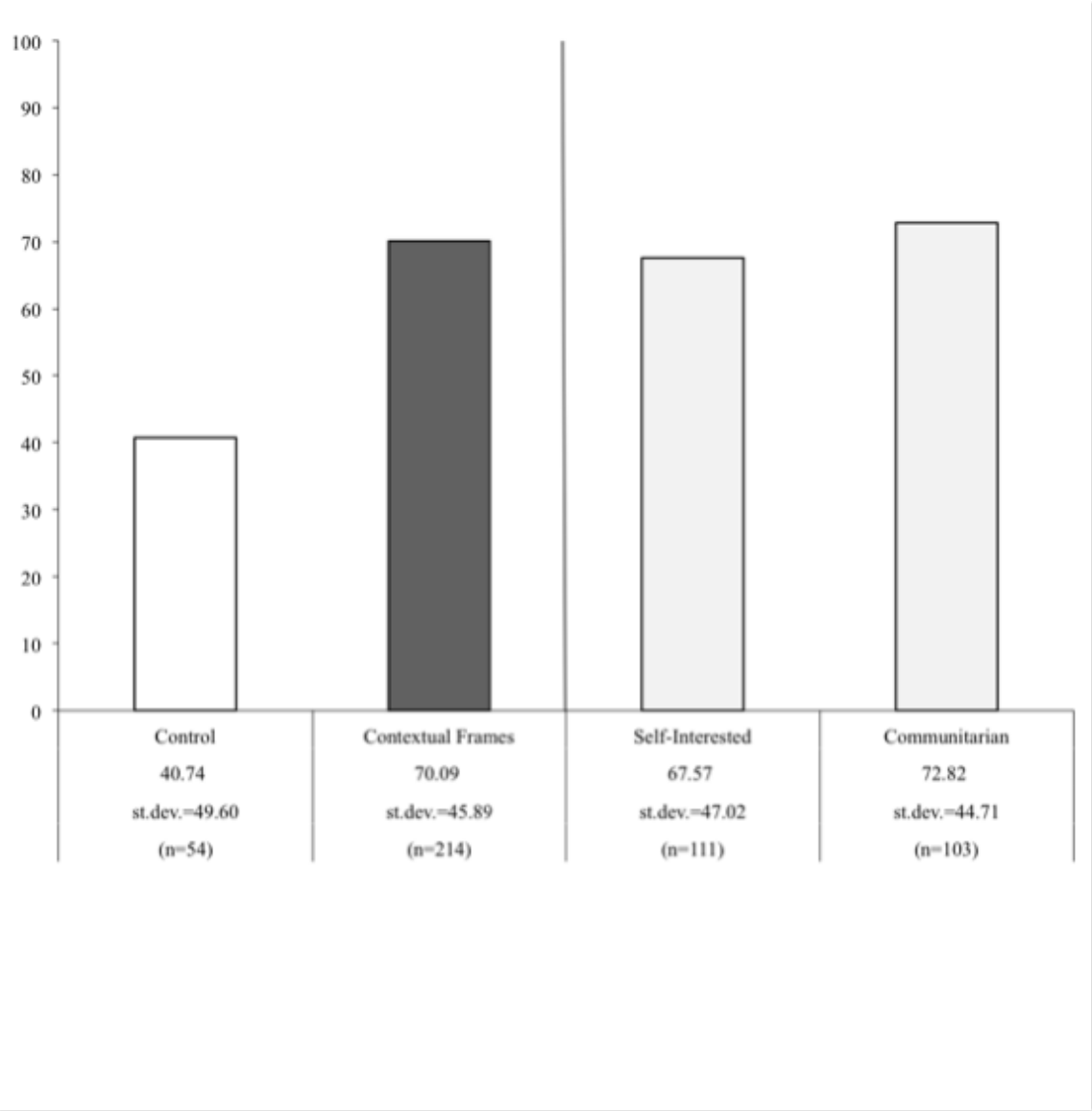


Table 3.7: *The Effect of Contextual Framing on CEPP Interest*

	(1) Contextual Framing vs. Control		(2) Self-Interested vs. Control		(3) Communitarian vs. Control	
	Point Estimate	95% Interval	Point Estimate	95% Interval	Point Estimate	95% Interval
Individual OLS	0.294***	(0.154, 0.433)	0.268***	(0.111, 0.425)	0.321***	(0.167, 0.475)
Individual OLS, robust cluster standard errors	0.294***	(0.124, 0.463)	0.268***	(0.086, 0.450)	0.321***	(0.129, 0.512)
Individual OLS, covariates and robust cluster standard errors	0.268**	(0.039, 0.497)	0.232*	(-0.012, 0.475)	0.31***	(0.074, 0.546)
Cluster Aggregated OLS	0.285***	(0.113, 0.467)	0.215**	(0.010, 0.420)	0.36***	(0.183, 0.536)

Notes: *** indicates statistical significance at the 0.01 level, ** at the 0.05 level, and * at the 0.10 level.

We obtained similar estimated causal effects under the model specification that include covariates and apartment block fixed effects (26.8 percent for the contextual frame treatment), as well as the cluster-aggregated OLS (28.5 percent for the contextual frame treatment). See Table 3.7 above.

3.7.2 Did Contextual Frames Increase CEPP Attendance?

Overall, contextual frames had a negligible effect in increasing CEPP attendance. None of the residents in the control and communitarian treatment groups attended the CEPP; 1.8 percent of the residents in the self-interest treatment group attended the CEPP, though this difference was insignificant at the 5 percent level. See Table 3.8 below, which summarizes the estimated causal effects of the different contextual frames under various model specifications. Moreover, we observed a stark gap between stated intentions and actual behavior. Ninety-nine percent of the residents who received a contextual frame treatment and indicated their interest to attend the CEPP did not turn up; none of the residents who indicated their interest to attend the CEPP turned up (see Table 3.9).

Table 3.8: *The Effect of Contextual Framing on CEPP Attendance*

	(1) Contextual Framing vs. Control		(2) Self-Interested vs. Control		(3) Communitarian vs. Control	
	Point Estimate	95% Interval	Point Estimate	95% Interval	Point Estimate	95% Interval
Individual OLS	0.009	(-0.017, 0.035)	0.018	(-0.018, 0.053)	0	N/A
Individual OLS, robust cluster standard errors	0.009	(-0.009, 0.027)	0.018	(-0.016, 0.051)	0	N/A
Individual OLS, covariates and robust cluster standard errors	0.009	(-0.014, 0.032)	0.024	(-0.019, 0.067)	0	N/A
Cluster Aggregated OLS	0.005	(-0.018, 0.009)	0.009	(-0.028, 0.010)	0	N/A

Notes: *** indicates statistical significance at the 0.01 level, ** at the 0.05 level, and * at the 0.10 level.

Table 3.9: *Intention-Behavior Gap Among Respondents*

	CEPP Interest (%)	CEPP Attendance, Of Those Interested (%)	Attrition Rate
Contextual Frame	73.39	1.25	98.75
Self-interested Frame	68.97	2.5	97.5
Communitarian Frame	78.43	0	100
Control Group	40.74	0	100

3.7.3 Did Follow-Through Prompts Increase CEPP Attendance?

By contrast, the findings for the follow-through prompts were mixed. Receiving an informational package on upcoming CEPP sessions had a negligible effect on CEPP attendance, whereas receiving the preregistration package significantly increased CEPP attendance. Specifically, 11.3 percent of those who received the preregistration package attended the CEPP (estimated ITT), whereas 15.7 percent of those who actually preregistered attended the CEPP (estimated CATE). By comparison, 1.3 percent of those who received the informational package and none of those in the control group attended the CEPP. Figure 3.7 below summarizes.

Figure 3.7: *CEPP Attendance Across the Follow-Through Prompt Treatment Groups*

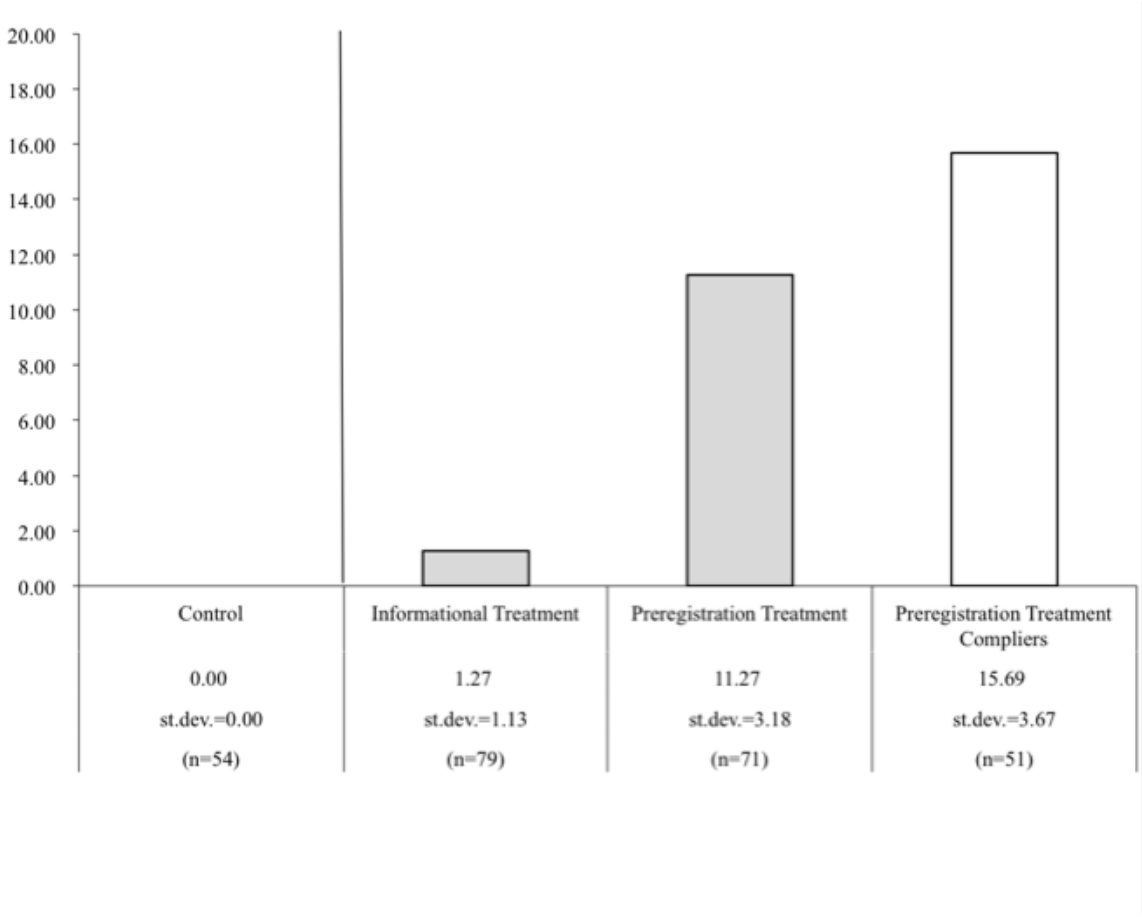


Table 3.10: *The Effect of Follow-Through Prompts on CEPP Attendance*

	Intent-to-Treat Effect (ITT)				Complier Average Treatment Effect (CATE)	
	(1) Informational vs. Control		(2) Assigned Preregistration vs. Control		(3) Actual Preregistration vs. Control	
	Point Estimate	95% Interval	Point Estimate	95% Interval	Point Estimate	95% Interval
Individual OLS	0.013	(-0.057, 0.082)	0.113***	(0.041, 0.184)	0.157**	(0.016, 0.298)
Individual OLS, robust cluster standard errors	0.013	(-0.011, 0.037)	0.113***	(0.044, 0.181)	0.157***	(0.073, 0.241)
Individual OLS, covariates and robust cluster standard errors	0.009	(-0.056, 0.076)	0.143***	(0.050, 0.236)	0.195**	(0.027, 0.364)
Cluster Aggregated OLS	0.005	(-0.005, 0.015)	0.081**	(0.024, 0.138)	NA	NA

Notes: *** indicates statistical significance at the 0.01 level, ** at the 0.05 level, and * at the 0.10 level.

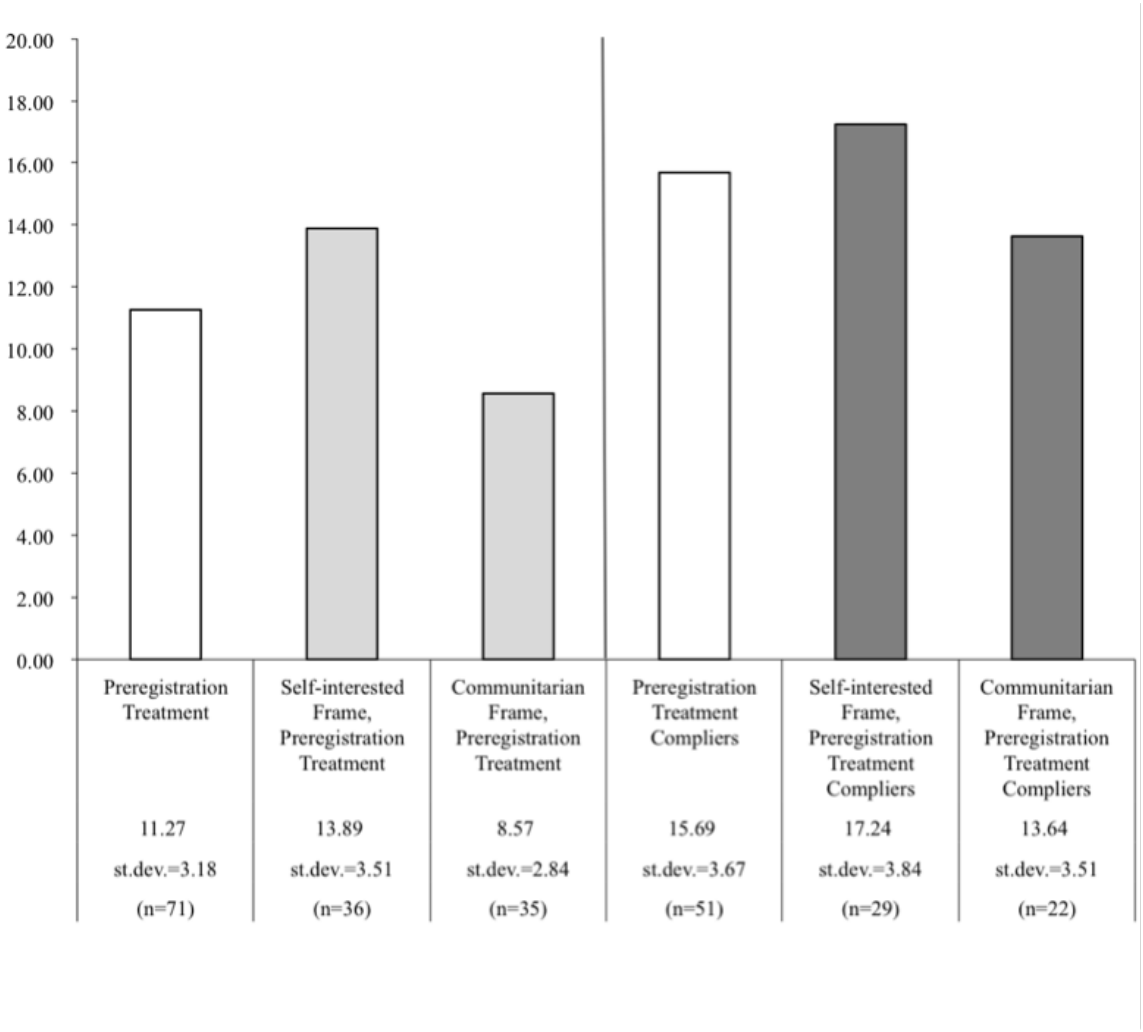
We obtained similar estimated causal effects for the preregistration package under the model specification that included covariates and apartment block fixed effects (estimated ITT of 14.3 percent and estimated CATE of 19.5 percent), as well as the cluster-aggregated OLS (estimated ITT of 8.1 percent; CATE could not be estimated). See Table 3.10 above. Interestingly, 22 percent of those who attended the CEPP brought their family members with them, so the reported treatment effects represent conservative estimates that do not account for possible network and contagion effects.

3.7.4 Interaction Effects: Contextual Frames and Preregistration Package

The effect of the preregistration package appeared to vary according to the type of contextual frame previously received. Residents who received the self-interest frame and preregistration package were more likely to attend the CEPP, compared to those who received the communitarian frame and preregistration package (ITT: 13.9 percent for self-interest frame vs. 8.6 percent for communitarian frame; CATE: 17.2 percent for self-interest frame vs. 13.6 percent for communitarian frame).

These differences, however, were insignificant at the 5 percent level. Figure 3.8 below summarizes. The left-hand side presents the ITT estimates; the right-hand side presents the CATE estimates.

Figure 3.8: *CEPP Attendance Across the Engagement Prompt Treatment Groups*



3.8 Conclusion

Overall, the most effective behavioral intervention — a contextual frame followed by the preregistration package — paired persuasive communication with a follow-through prompt that incorporated making a plan, commitment and reminder mechanisms, and social pressure. Though our study focused on residents living in fire-prone apartment buildings in Singapore, we argue that the experimental findings are generally applicable to public engagement campaigns across a wide range of issues, since they derive from behavioral interventions that were designed to address universal behavioral biases. More importantly, the proposed behavioral intervention is nearly costless and easily integrated into existing public engagement campaigns. In our study, this involved: (1) framing messages to emphasize how undertaking a specific action benefited the target respondent; (2) eliciting the target respondent's behavioral intent; (3) facilitating target respondents who had indicated an interest to change their behavior to follow-through on their intentions, by prompting them to make a plan and commit to that plan; (4) providing them with a visual reminder of their plan and commitment; (5) using social pressure to entrench their commitment.

Judging from the size of the substantive effects and the evidence of network and contagion effects, the proposed behavioral intervention that combines contextual frames with the preregistration package could have potentially huge impact in shaping behaviors. The pilot experiment encompassed four post-fire blitzes with 268 respondents; the proposed behavioral intervention was implemented on 71 of the 268 respondents (26.5 percent of the sample). We had also conservatively estimated the intent-to-treat (ITT) effect to be 11.3 percent and the complier average treatment effect (CATE) to be 15.7 percent.[33] Suppose the SCDF were to adopt the proposed behavioral intervention across all future post-fire blitzes, and that there were 100 post-fire blitzes annually. If the number of respondents remained approximately the same, then the SCDF would

[33]With further fine-tuning of the contextual frames, the impact could potentially be higher.

have reached out to 6,700 respondents. The estimated number of CEPP attendees would therefore range from 757 people to 1052 residents, compared to an estimated 0 attendees under the status quo post-fire blitz.

We address several limitations of our study that arise from defining our outcome measure as CEPP attendance. From a practical perspective, CEPP attendance is at best an indirect measure of an individual's level of emergency preparedness, which is the outcome of interest that the SCDF and MHA ultimately seek to improve. The CEPP is a full-day, face-to-face public educational program that provides participants with theoretical and practical training in emergency preparedness skills. One would intuitively expect CEPP graduates to be more likely to undertake costly actions to raise their emergency preparedness levels, such as fireproofing their homes, or assembling and maintaining a first aid kit. They, however, suffer from the same psychological and cognitive biases that prevented the residents in our experiment who had indicated their interest to participate in the CEPP from actually attending the CEPP. In other words, there is no guarantee that CEPP graduates would internalize the lessons from the CEPP and apply their new knowledge to their everyday lives.

Theoretically, attending the CEPP requires making a one-off, costly behavioral change. However, many real-life decisions (e.g., eating healthy, exercising), including raising emergency preparedness levels, require repeated, sustained behavioral change over the longer-term. Allcott and Rogers (2012) find that repeated interventions could sometimes generate sustained long-run behavioral change, and speculate that this arises because people learn new habits of behavior. Their argument echoes previous research that finds that past past behavior predicts future behavior (Ouellete and Wood 1998; Ajzen 2002). However, they also find that people repeatedly cycle through action and inaction in response to repeated interventions. In other words, repeated interventions do not guarantee sustained behavioral change. It therefore remains an open question in applied behav-

ioral research as to whether and how behavioral nudges can induce long-term, sustained behavioral change.

In conclusion, despite the limitations of our study, the success of the proposed behavioral intervention in increasing CEPP attendance hints at the potential of incorporating nudges that simultaneously target multiple psychological and cognitive barriers to behavioral change into public engagement campaigns. We aim to address the aforementioned shortcomings of our study in two follow-up pilot experiments with the MHA and SCDF. The first examines which pedagogical features increase the efficacy of the CEPP in imparting emergency preparedness skills to CEPP participants in the short-term. The second explores whether CEPP participants maintain their level of emergency preparedness over the longer term.

Appendix A-1

A-1-1: Experimental Protocol for Treatment 1
(No Information + Pure Altruism)

NOTE TO INTERVIEWER:
PLEASE READ ONLY THE PARAGRAPH CORRESPONDING TO THE RESPONDENT'S PRE-ASSIGNED TREATMENT PROTOCOL.
FOR ALL CONDITIONS, IF RESPONDENTS ASK FOR MORE INFORMATION, DO NOT PROVIDE ADDITIONAL INFORMATION BEYOND WHAT IS STATED IN EACH CONDITION. JUST SAY: "SORRY, ALL I KNOW IS THAT THE CHILDREN ARE FROM TOUCH YOUNG ARROWS."
IF RESPONDENTS ASK IF DOING THE POSTCARD IS VOLUNTEERING, ASSURE THEM THAT IT IS.

Step 1: Implementation of Treatment Protocol
[READ OUT] Before we end our interview, I would like to share with you how you can help poor children in Singapore through emotional support. You could write or draw a personal message of encouragement on this postcard, then mail it to us, and we will give it to children from TOUCH Young Arrows, a programme under TOUCH Community Services.

[SHOWCARD & READ OUT]

Factor 1: No Information on Poverty (0)

NOTE TO INTERVIEWER: PROCEED TO FACTOR 2.

Factor 2: Appeal to Pure Altruism (1)

Why should you volunteer? Well,

Many volunteers believe that by volunteering, you can make a real difference in the lives of these poor children.

NOTE TO INTERVIEWER: PROCEED TO STEP 2.

Step 2: Pre-registration
Q73. **[READ OUT]** Would you like to help poor children through emotional support with this postcard?

Yes	1
No	2

Step 3: Registration
[IF YES TO Q73]: [READ OUT] Thanks, here is the postcard. Please take some time to think about your personal message of encouragement to the children and write or draw it on the postcard. Then mail it to NVPC by _____ **[READ OUT DEADLINE WHICH IS 1 MONTH FROM DATE OF INTERVIEW]**. When do you intend to mail the postcard?
[INTERVIEWER TO NOTE DATE IN DDMMYY FORMAT. IF RESPONDENTS ANSWER "NEXT WEEK", THEN INTERVIEWER IS TO SUGGEST THE DATE FOR NEXT SUNDAY. IF THEY SAY "BEFORE DEADLINE", INTERVIEWER IS TO SUGGEST THE DATE BEFORE DEADLINE TO THE RESPONDENT. RESPONDENTS ARE TO ACKNOWLEDGE THE DATE]: _____.

[IF NO, THANK RESPONDENT FOR TIME AND CLOSE INTERVIEW.]

A-1-2: Experimental Protocol for Treatment 2
(No Information + Self Image)

NOTE TO INTERVIEWER:
PLEASE READ ONLY THE PARAGRAPH CORRESPONDING TO THE RESPONDENT'S PRE-ASSIGNED TREATMENT PROTOCOL.
FOR ALL CONDITIONS, IF RESPONDENTS ASK FOR MORE INFORMATION, DO NOT PROVIDE ADDITIONAL INFORMATION BEYOND WHAT IS STATED IN EACH CONDITION. JUST SAY: "SORRY, ALL I KNOW IS THAT THE CHILDREN ARE FROM TOUCH YOUNG ARROWS."
IF RESPONDENTS ASK IF DOING THE POSTCARD IS VOLUNTEERING, ASSURE THEM THAT IT IS.

Step 1: Implementation of Treatment Protocol
[READ OUT] Before we end our interview, I would like to share with you how you can help poor children in Singapore through emotional support. You could write or draw a personal message of encouragement on this postcard, then mail it to us, and we will give it to children from TOUCH Young Arrows, a programme under TOUCH Community Services.

[SHOWCARD & READ OUT]

Factor 1: No Information on Poverty (0)

NOTE TO INTERVIEWER: PROCEED TO FACTOR 2.

Factor 2: Appeal to Self-image (2)
Why should you volunteer? Well,

Many volunteers believe that volunteering is an important part of being a good citizen.

NOTE TO INTERVIEWER: PROCEED TO STEP 2.

Step 2: Pre-registration
Q73. **[READ OUT]** Would you like to help poor children through emotional support with this postcard?

Yes	1
No	2

Step 3: Registration
[IF YES TO Q73]: [READ OUT] Thanks, here is the postcard. Please take some time to think about your personal message of encouragement to the children and write or draw it on the postcard. Then mail it to NVPC by _____ **[READ OUT DEADLINE WHICH IS 1 MONTH FROM DATE OF INTERVIEW]**. When do you intend to mail the postcard?
[INTERVIEWER TO NOTE DATE IN DDMMYY FORMAT. IF RESPONDENTS ANSWER "NEXT WEEK", THEN INTERVIEWER IS TO SUGGEST THE DATE FOR NEXT SUNDAY. IF THEY SAY "BEFORE DEADLINE", INTERVIEWER IS TO SUGGEST THE DATE BEFORE DEADLINE TO THE RESPONDENT. RESPONDENTS ARE TO ACKNOWLEDGE THE DATE]: _____.

[IF NO, THANK RESPONDENT FOR TIME AND CLOSE INTERVIEW.]

A-1-3: Experimental Protocol for Treatment 3
(No Information + Self Interest)

NOTE TO INTERVIEWER:
PLEASE READ ONLY THE PARAGRAPH CORRESPONDING TO THE RESPONDENT'S PRE-ASSIGNED TREATMENT PROTOCOL.
FOR ALL CONDITIONS, IF RESPONDENTS ASK FOR MORE INFORMATION, DO NOT PROVIDE ADDITIONAL INFORMATION BEYOND WHAT IS STATED IN EACH CONDITION. JUST SAY: "SORRY, ALL I KNOW IS THAT THE CHILDREN ARE FROM TOUCH YOUNG ARROWS."
IF RESPONDENTS ASK IF DOING THE POSTCARD IS VOLUNTEERING, ASSURE THEM THAT IT IS.

Step 1: Implementation of Treatment Protocol
[READ OUT] Before we end our interview, I would like to share with you how you can help poor children in Singapore through emotional support. You could write or draw a personal message of encouragement on this postcard, then mail it to us, and we will give it to children from TOUCH Young Arrows, a programme under TOUCH Community Services.

[SHOWCARD & READ OUT]

Factor 1: No Information on Poverty (0)

NOTE TO INTERVIEWER: PROCEED TO FACTOR 2.

Factor 2: Appeal to Self-interest (3)

Why should you volunteer? Well,

Many volunteers believe that volunteering provides you with valuable new skills and experiences.

NOTE TO INTERVIEWER: PROCEED TO STEP 2.

Step 2: Pre-registration
Q73. **[READ OUT]** Would you like to help poor children through emotional support with this postcard?

Yes	1
No	2

Step 3: Registration
[IF YES TO Q73]: [READ OUT] Thanks, here is the postcard. Please take some time to think about your personal message of encouragement to the children and write or draw it on the postcard. Then mail it to NVPC by _____ **[READ OUT DEADLINE WHICH IS 1 MONTH FROM DATE OF INTERVIEW]**. When do you intend to mail the postcard?
[INTERVIEWER TO NOTE DATE IN DDMMYY FORMAT. IF RESPONDENTS ANSWER "NEXT WEEK", THEN INTERVIEWER IS TO SUGGEST THE DATE FOR NEXT SUNDAY. IF THEY SAY "BEFORE DEADLINE", INTERVIEWER IS TO SUGGEST THE DATE BEFORE DEADLINE TO THE RESPONDENT. RESPONDENTS ARE TO ACKNOWLEDGE THE DATE]: _____.

[IF NO, THANK RESPONDENT FOR TIME AND CLOSE INTERVIEW.]

A-1-4: Experimental Protocol for Treatment 4
(No Information + Impure Altruism)

NOTE TO INTERVIEWER:
PLEASE READ ONLY THE PARAGRAPH CORRESPONDING TO THE RESPONDENT'S PRE-ASSIGNED TREATMENT PROTOCOL.
FOR ALL CONDITIONS, IF RESPONDENTS ASK FOR MORE INFORMATION, DO NOT PROVIDE ADDITIONAL INFORMATION BEYOND WHAT IS STATED IN EACH CONDITION. JUST SAY: "SORRY, ALL I KNOW IS THAT THE CHILDREN ARE FROM TOUCH YOUNG ARROWS."
IF RESPONDENTS ASK IF DOING THE POSTCARD IS VOLUNTEERING, ASSURE THEM THAT IT IS.

Step 1: Implementation of Treatment Protocol
[READ OUT] Before we end our interview, I would like to share with you how you can help poor children in Singapore through emotional support. You could write or draw a personal message of encouragement on this postcard, then mail it to us, and we will give it to children from TOUCH Young Arrows, a programme under TOUCH Community Services.

[SHOWCARD & READ OUT]

Factor 1: No Information on Poverty (0)

NOTE TO INTERVIEWER: PROCEED TO FACTOR 2.

Factor 2: Appeal to Impure Altruism (4)

Why should you volunteer? Well,

Many volunteers believe that volunteering gives you a strong feeling of satisfaction and pride.

NOTE TO INTERVIEWER: PROCEED TO STEP 2.

Step 2: Pre-registration
Q73. **[READ OUT]** Would you like to help poor children through emotional support with this postcard?

Yes	1
No	2

Step 3: Registration
[IF YES TO Q73]: [READ OUT] Thanks, here is the postcard. Please take some time to think about your personal message of encouragement to the children and write or draw it on the postcard. Then mail it to NVPC by _____ **[READ OUT DEADLINE WHICH IS 1 MONTH FROM DATE OF INTERVIEW]**. When do you intend to mail the postcard?
[INTERVIEWER TO NOTE DATE IN DDMMYY FORMAT. IF RESPONDENTS ANSWER "NEXT WEEK", THEN INTERVIEWER IS TO SUGGEST THE DATE FOR NEXT SUNDAY. IF THEY SAY "BEFORE DEADLINE", INTERVIEWER IS TO SUGGEST THE DATE BEFORE DEADLINE TO THE RESPONDENT. RESPONDENTS ARE TO ACKNOWLEDGE THE DATE]: _____.

[IF NO, THANK RESPONDENT FOR TIME AND CLOSE INTERVIEW.]

A-1-5: Experimental Protocol for Treatment 5
(Information + Pure Altruism)

NOTE TO INTERVIEWER:
PLEASE READ ONLY THE PARAGRAPH CORRESPONDING TO THE RESPONDENT'S PRE-ASSIGNED TREATMENT PROTOCOL.
FOR ALL CONDITIONS, IF RESPONDENTS ASK FOR MORE INFORMATION, DO NOT PROVIDE ADDITIONAL INFORMATION BEYOND WHAT IS STATED IN EACH CONDITION. JUST SAY: "SORRY, ALL I KNOW IS THAT THE CHILDREN ARE FROM TOUCH YOUNG ARROWS."
IF RESPONDENTS ASK IF DOING THE POSTCARD IS VOLUNTEERING, ASSURE THEM THAT IT IS.

Step 1: Implementation of Treatment Protocol
[READ OUT] Before we end our interview, I would like to share with you how you can help poor children in Singapore through emotional support. You could write or draw a personal message of encouragement on this postcard, then mail it to us, and we will give it to children from TOUCH Young Arrows, a programme under TOUCH Community Services.

[SHOWCARD & READ OUT]

Factor 1: Information on Poverty (1)
These children are ages 6-12 from low-income or single-parent families.

To give you a brief background, childhood poverty is an important issue in Singapore. Today, about 10 percent of households earn less than S$1,250 a month. This is the average amount needed by a four-person household to meet basic needs such as clothing, food, shelter, and other essentials. Children from these households are severely disadvantaged growing up as they experience more stress and lack adequate resources to succeed in school. Volunteer organisations are trying to address this issue and are seeking volunteers to help poor children.

NOTE TO INTERVIEWER: PROCEED TO FACTOR 2

Factor 2: Appeal to Pure Altruism (1)
Why should you volunteer? Well,

Many volunteers believe that by volunteering, you can make a real difference in the lives of these poor children.

NOTE TO INTERVIEWER: PROCEED TO STEP 2.

Step 2: Pre-registration
Q73. **[READ OUT]** Would you like to help poor children through emotional support with this postcard?

Yes	1
No	2

Step 3: Registration
[IF YES TO Q73]: [READ OUT] Thanks, here is the postcard. Please take some time to think about your personal message of encouragement to the children and write or draw it on the postcard. Then mail it to NVPC by _____ **[READ OUT DEADLINE WHICH IS 1 MONTH FROM DATE OF INTERVIEW]**. When do you intend to mail the postcard?

[INTERVIEWER TO NOTE DATE IN DDMMYY FORMAT. IF RESPONDENTS ANSWER "NEXT WEEK", THEN INTERVIEWER IS TO SUGGEST THE DATE FOR NEXT SUNDAY. IF THEY SAY "BEFORE DEADLINE", INTERVIEWER IS TO SUGGEST THE DATE BEFORE DEADLINE TO THE RESPONDENT. RESPONDENTS ARE TO ACKNOWLEDGE THE DATE]: _____.

A-1-6: Experimental Protocol for Treatment 6
(Information + Self Image)

NOTE TO INTERVIEWER:
PLEASE READ ONLY THE PARAGRAPH CORRESPONDING TO THE RESPONDENT'S PRE-ASSIGNED TREATMENT PROTOCOL.
FOR ALL CONDITIONS, IF RESPONDENTS ASK FOR MORE INFORMATION, DO NOT PROVIDE ADDITIONAL INFORMATION BEYOND WHAT IS STATED IN EACH CONDITION. JUST SAY: "SORRY, ALL I KNOW IS THAT THE CHILDREN ARE FROM TOUCH YOUNG ARROWS."
IF RESPONDENTS ASK IF DOING THE POSTCARD IS VOLUNTEERING, ASSURE THEM THAT IT IS.

Step 1: Implementation of Treatment Protocol
[READ OUT] Before we end our interview, I would like to share with you how you can help poor children in Singapore through emotional support. You could write or draw a personal message of encouragement on this postcard, then mail it to us, and we will give it to children from TOUCH Young Arrows, a programme under TOUCH Community Services.

[SHOWCARD & READ OUT]

Factor 1: Information on Poverty (1)
These children are ages 6-12 from low-income or single-parent families.

To give you a brief background, childhood poverty is an important issue in Singapore. Today, about 10 percent of households earn less than S$1,250 a month. This is the average amount needed by a four-person household to meet basic needs such as clothing, food, shelter, and other essentials. Children from these households are severely disadvantaged growing up as they experience more stress and lack adequate resources to succeed in school. Volunteer organisations are trying to address this issue and are seeking volunteers to help poor children.

NOTE TO INTERVIEWER: PROCEED TO FACTOR 2

Factor 2: Appeal to Pure Altruism (1)
Why should you volunteer? Well,

Many volunteers believe that volunteering is an important part of being a good citizen.

NOTE TO INTERVIEWER: PROCEED TO STEP 2.

Step 2: Pre-registration
Q73. **[READ OUT]** Would you like to help poor children through emotional support with this postcard?

Yes	1
No	2

Step 3: Registration
[IF YES TO Q73]: [READ OUT] Thanks, here is the postcard. Please take some time to think about your personal message of encouragement to the children and write or draw it on the postcard. Then mail it to NVPC by _____ **[READ OUT DEADLINE WHICH IS 1 MONTH FROM DATE OF INTERVIEW]**. When do you intend to mail the postcard?

[INTERVIEWER TO NOTE DATE IN DDMMYY FORMAT. IF RESPONDENTS ANSWER "NEXT WEEK", THEN INTERVIEWER IS TO SUGGEST THE DATE FOR NEXT SUNDAY. IF THEY SAY "BEFORE DEADLINE", INTERVIEWER IS TO SUGGEST THE DATE BEFORE DEADLINE TO THE RESPONDENT. RESPONDENTS ARE TO ACKNOWLEDGE THE DATE]: _____.

[IF NO, THANK RESPONDENT FOR TIME AND CLOSE INTERVIEW.]

A-1-7: Experimental Protocol for Treatment 7
(Information + Self Interest)

NOTE TO INTERVIEWER:
PLEASE READ ONLY THE PARAGRAPH CORRESPONDING TO THE RESPONDENT'S PRE-ASSIGNED TREATMENT PROTOCOL.
FOR ALL CONDITIONS, IF RESPONDENTS ASK FOR MORE INFORMATION, DO NOT PROVIDE ADDITIONAL INFORMATION BEYOND WHAT IS STATED IN EACH CONDITION. JUST SAY: "SORRY, ALL I KNOW IS THAT THE CHILDREN ARE FROM TOUCH YOUNG ARROWS."
IF RESPONDENTS ASK IF DOING THE POSTCARD IS VOLUNTEERING, ASSURE THEM THAT IT IS.

Step 1: Implementation of Treatment Protocol
[READ OUT] Before we end our interview, I would like to share with you how you can help poor children in Singapore through emotional support. You could write or draw a personal message of encouragement on this postcard, then mail it to us, and we will give it to children from TOUCH Young Arrows, a programme under TOUCH Community Services.

[SHOWCARD & READ OUT]

Factor 1: Information on Poverty (1)
These children are ages 6-12 from low-income or single-parent families.

To give you a brief background, childhood poverty is an important issue in Singapore. Today, about 10 percent of households earn less than S$1,250 a month. This is the average amount needed by a four-person household to meet basic needs such as clothing, food, shelter, and other essentials. Children from these households are severely disadvantaged growing up as they experience more stress and lack adequate resources to succeed in school. Volunteer organisations are trying to address this issue and are seeking volunteers to help poor children.

NOTE TO INTERVIEWER: PROCEED TO FACTOR 2

Factor 2: Appeal to Pure Altruism (1)
Why should you volunteer? Well,

Many volunteers believe that volunteering provides you with valuable new skills and experiences.

NOTE TO INTERVIEWER: PROCEED TO STEP 2.

Step 2: Pre-registration
Q73. **[READ OUT]** Would you like to help poor children through emotional support with this postcard?

Yes	1
No	2

Step 3: Registration
[IF YES TO Q73]: [READ OUT] Thanks, here is the postcard. Please take some time to think about your personal message of encouragement to the children and write or draw it on the postcard. Then mail it to NVPC by _____ **[READ OUT DEADLINE WHICH IS 1 MONTH FROM DATE OF INTERVIEW]**. When do you intend to mail the postcard?

[INTERVIEWER TO NOTE DATE IN DDMMYY FORMAT. IF RESPONDENTS ANSWER "NEXT WEEK", THEN INTERVIEWER IS TO SUGGEST THE DATE FOR NEXT SUNDAY. IF THEY SAY "BEFORE DEADLINE", INTERVIEWER IS TO SUGGEST THE DATE BEFORE DEADLINE TO THE RESPONDENT. RESPONDENTS ARE TO ACKNOWLEDGE THE DATE]: _____.

[IF NO, THANK RESPONDENT FOR TIME AND CLOSE INTERVIEW.]

A-1-8: Experimental Protocol for Treatment 7
(Information + Impure Altruism)

NOTE TO INTERVIEWER:
PLEASE READ ONLY THE PARAGRAPH CORRESPONDING TO THE RESPONDENT'S PRE-ASSIGNED TREATMENT PROTOCOL.
FOR ALL CONDITIONS, IF RESPONDENTS ASK FOR MORE INFORMATION, DO NOT PROVIDE ADDITIONAL INFORMATION BEYOND WHAT IS STATED IN EACH CONDITION. JUST SAY: "SORRY, ALL I KNOW IS THAT THE CHILDREN ARE FROM TOUCH YOUNG ARROWS."
IF RESPONDENTS ASK IF DOING THE POSTCARD IS VOLUNTEERING, ASSURE THEM THAT IT IS.

Step 1: Implementation of Treatment Protocol
[READ OUT] Before we end our interview, I would like to share with you how you can help poor children in Singapore through emotional support. You could write or draw a personal message of encouragement on this postcard, then mail it to us, and we will give it to children from TOUCH Young Arrows, a programme under TOUCH Community Services.

[SHOWCARD & READ OUT]

Factor 1: Information on Poverty (1)
These children are ages 6-12 from low-income or single-parent families.

To give you a brief background, childhood poverty is an important issue in Singapore. Today, about 10 percent of households earn less than S$1,250 a month. This is the average amount needed by a four-person household to meet basic needs such as clothing, food, shelter, and other essentials. Children from these households are severely disadvantaged growing up as they experience more stress and lack adequate resources to succeed in school. Volunteer organisations are trying to address this issue and are seeking volunteers to help poor children.

NOTE TO INTERVIEWER: PROCEED TO FACTOR 2

Factor 2: Appeal to Pure Altruism (1)
Why should you volunteer? Well,

Many volunteers believe that volunteering gives you a strong feeling of satisfaction and pride.

NOTE TO INTERVIEWER: PROCEED TO STEP 2.

Step 2: Pre-registration
Q73. **[READ OUT]** Would you like to help poor children through emotional support with this postcard?

Yes	1
No	2

Step 3: Registration
[IF YES TO Q73]: [READ OUT] Thanks, here is the postcard. Please take some time to think about your personal message of encouragement to the children and write or draw it on the postcard. Then mail it to NVPC by _____ **[READ OUT DEADLINE WHICH IS 1 MONTH FROM DATE OF INTERVIEW]**. When do you intend to mail the postcard?

[INTERVIEWER TO NOTE DATE IN DDMMYY FORMAT. IF RESPONDENTS ANSWER "NEXT WEEK", THEN INTERVIEWER IS TO SUGGEST THE DATE FOR NEXT SUNDAY. IF THEY SAY "BEFORE DEADLINE", INTERVIEWER IS TO SUGGEST THE DATE BEFORE DEADLINE TO THE RESPONDENT. RESPONDENTS ARE TO ACKNOWLEDGE THE DATE]: _____.

[IF NO, THANK RESPONDENT FOR TIME AND CLOSE INTERVIEW.]

A-1-9: Experimental Protocol for Treatment 9 (Control)
(No Information + No Motivation Frame)

NOTE TO INTERVIEWER:
PLEASE READ ONLY THE PARAGRAPH CORRESPONDING TO THE RESPONDENT'S PRE-ASSIGNED TREATMENT PROTOCOL.
FOR ALL CONDITIONS, IF RESPONDENTS ASK FOR MORE INFORMATION, DO NOT PROVIDE ADDITIONAL INFORMATION BEYOND WHAT IS STATED IN EACH CONDITION. JUST SAY: "SORRY, ALL I KNOW IS THAT THE CHILDREN ARE FROM TOUCH YOUNG ARROWS."
IF RESPONDENTS ASK IF DOING THE POSTCARD IS VOLUNTEERING, ASSURE THEM THAT IT IS.

Step 1: Implementation of Treatment Protocol
[READ OUT] Before we end our interview, I would like to share with you how you can help poor children in Singapore through emotional support. You could write or draw a personal message of encouragement on this postcard, then mail it to us, and we will give it to children from TOUCH Young Arrows, a programme under TOUCH Community Services.

Step 2: Pre-registration
Q73. **[READ OUT]** Would you like to help poor children through emotional support with this postcard**?**

Yes	1
No	2

Step 3: Registration
[IF YES TO Q73]: [READ OUT] Thanks, here is the postcard. Please take some time to think about your personal message of encouragement to the children and write or draw it on the postcard. Then mail it to NVPC by _____ **[READ OUT DEADLINE WHICH IS 1 MONTH FROM DATE OF INTERVIEW]**. When do you intend to mail the postcard?
[INTERVIEWER TO NOTE DATE IN DDMMYY FORMAT. IF RESPONDENTS ANSWER "NEXT WEEK", THEN INTERVIEWER IS TO SUGGEST THE DATE FOR NEXT SUNDAY. IF THEY SAY "BEFORE DEADLINE", INTERVIEWER IS TO SUGGEST THE DATE BEFORE DEADLINE TO THE RESPONDENT. RESPONDENTS ARE TO ACKNOWLEDGE THE DATE]: _____.

[IF NO, THANK RESPONDENT FOR TIME AND CLOSE INTERVIEW.]

Appendix A-2

Table A-2-1: Summary of Data

	Variable	Description
Dependent Variable	Volunteer Interest	Binary variable, coded 1 if respondent engaged in formal volunteering in the past 12 months, 0 otherwise
	Volunteered	Binary variable, coded 1 if respondent engaged in informal volunteering in the past 12 months, 0 otherwise
Contextual Information	Info	Binary variable, coded 1 if respondent was assigned to receive information on childhood poverty, 0 otherwise
	No Info	Binary variable, coded 1 if respondent was assigned to receive no information on childhood poverty, 0 otherwise
Motivational Frames	Pure Altruism	Binary variable, coded 1 if respondent was assigned to receive pure altruism motivational frame, 0 otherwise
	Impure Altruism	Binary variable, coded 1 if respondent was assigned to receive impure altruism motivational frame, 0 otherwise
	Self-Image	Binary variable, coded 1 if respondent was assigned to receive self-image motivational frame, 0 otherwise
	Self-Interest	Binary variable, coded 1 if respondent was assigned to receive self-interest motivational frame, 0 otherwise
	Control	Binary variable, coded 1 if respondent was assigned to receive no motivational frame, 0 otherwise
Individual Characteristics	Current Volunteer	Binary variable, coded 1 if respondent volunteered in the past 12 months, 0 otherwise
	Former Volunteer	Binary variable, coded 1 if respondent volunteered more than 12 months ago, 0 otherwise
	Non-Volunteer	Binary variable, coded 1 if respondent has never volunteered before, 0 otherwise
	Age	Categorical variable, self-reported age
	Male	Binary variable, coded 1 for males, 0 otherwise
	Chinese	Binary variable, coded 1 for Chinese, 0 otherwise
	Indian	Binary variable, coded 1 for Indian, 0 otherwise
	Malay	Binary variable, coded 1 for Malay, 0 otherwise
	Other	Binary variable, coded 1 for Other races, 0 otherwise
	Tertiary	Binary variable, coded 1 for tertiary education or above, 0 otherwise
	Employed	Binary variable, coded 1 if respondent is employed, 0 otherwise
	Married	Binary variable, coded 1 for married, 0 otherwise
	Citizen	Binary variable, coded 1 for citizens, 0 otherwise
	Religious	Binary variable, coded 1 if respondent practices a religion, 0 otherwise
	Income	Categorical variable, self-reported income bracket
Attitudes Toward Giving	Self-help	Binary variable, coded 1 if respondent answered "Agree" and "Strong Agree" to the statement "I need to do more to help others or the community", 0 otherwise
	Government-help	Binary variable, coded 1 if respondent answered "Agree" and "Strong Agree" to the statement "Government needs to do more to help others or the community", 0 otherwise
	Donate	Binary variable, coded 1 if respondent donated in the past 12 months, 0 otherwise
Contextual Environment	Population Growth	Continuous variable, change in the population, within a planning area, between 2010 and 2000
	HDB	Binary variable, coded 1 if respondent lives in a HDB flat, 0 otherwise
	Condo	Binary variable, coded 1 if respondent lives in a private condo, 0 otherwise
	Landed	Binary variable, coded 1 if respondent lives in a landed house, 0 otherwise
	Racial Diversification	Continuous variable, change in the proportion of other racial groups, within a planning area, between 2010 and 2000
	Income Inequality	Continuous variable, ratio of 75th percentile household income over 25th percentile household income, within a planning area, in the year 2010
Geographic Region	Region 1	Binary variable, coded 1 if North-East Region, 0 otherwise
	Region 2	Binary variable, coded 1 if Central Region, 0 otherwise
	Region 3	Binary variable, coded 1 if East Region, 0 otherwise
	Region 4	Binary variable, coded 1 if North Region, 0 otherwise
	Region 5	Binary variable, coded 1 if West Region, 0 otherwise

Appendix A-3

Table A-3-1: Univariate Balance Diagnostics: Contextual Information Treatment Groups

	Contextual Information vs. No Contextual Information			
	Info	No info	Diff-in-Means	KS-Test p-value
Current volunteer	0.2	0.17	-0.03	0.856
Former volunteer	0.12	0.14	0.02	1
Non-volunteer	0.68	0.69	0.01	1
Age	43.8	45.3	1.53	0.106
Male	0.43	0.46	0.03	0.902
Chinese	0.7	0.72	0.02	0.996
Malay	0.14	0.12	-0.02	1
Indian	0.11	0.11	0.00	1
Other	0.05	0.05	0	1
Tertiary	0.36	0.35	-0.01	1
Married	0.64	0.67	0.03	0.95
Employed	0.54	0.53	-0.01	1
Citizen	0.85	0.83	-0.02	1
Religious	0.88	0.89	0.01	1
Income	3.35	3.37	0.02	0.888
Self-help	0.64	0.66	0.02	1
Gov-help	0.92	0.91	-0.01	1
Donated	0.81	0.85	0.04**	0.509
Population growth	21.1	20.2	-0.89	1
HDB	0.84	0.8	-0.03	0.709
Condo	0.11	0.14	0.03	0.913
Demographic Change	7.12	7.79	0.07	0.829
Income inequality	3.45	3.46	0.01	0.993

Notes: *** indicates statistical significance at the 0.01 level and ** at the 0.05 level. We report the means across treatment groups, difference-in-means and corresponding two-sample t-test with unequal variances, and the p-values from a two-sample Kolmogorov-Smirnov (KS) test. We consider a covariate imbalanced if the p-values from both the two-sample t-test and KS test suggest significance at the 5 percent level. The univariate balance diagnostics suggest that with the exception of the whether the respondent donated in the past twelve months, there are no observable differences between respondents assigned to the self-interested frame treatment group and control group, at the 5 percent level of significance.

Table A-3-2: Univariate Balance Diagnostics: Motivational Frame Treatment Groups

		Altruism vs. Control			Self-Image vs. Control			Self-Interest vs. Control			Impure Altruism vs. Control		
	Control	Altruism	Diff-in-Means	KS-Test p-value	Self-Image	Diff-in-Means	KS-Test p-value	Self-Interest	Diff-in-Means	KS-Test p-value	Impure Altruism	Diff-in-Means	KS-Test p-value
Current volunteer	0.24	0.2	0.04	0.961	0.19	0.05	0.829	0.15	**0.09****	0.234	0.19	0.05	0.909
Former volunteer	0.1	0.1	0	1	0.14	-0.04	0.981	0.14	-0.04	0.987	0.14	-0.04	0.972
Non-volunteer	0.66	0.71	-0.05	0.889	0.67	-0.01	1	0.71	-0.05	0.893	0.66	0	1
Age	45.1	45.8	-0.63	0.801	44.4	0.78	0.551	44	1.1	0.533	44.1	1	0.523
Male	0.47	0.41	0.06	0.676	0.46	0.01	1	0.47	-0.01	1	0.43	0.04	0.96
Chinese	0.72	0.75	-0.03	1	0.71	0.01	1	0.66	0.06	0.668	0.71	0.01	1
Malay	0.13	0.12	0.01	1	0.12	0.01	1	0.15	-0.02	1	0.14	-0.01	1
Indian	0.11	0.1	0.02	1	0.12	-0.01	1	0.13	-0.02	1	0.11	0	1
Other	0.04	0.04	0	1	0.05	0	1	0.06	-0.02	1	0.05	-0.01	1
Tertiary	0.38	0.38	0.01	1	0.35	0.03	1	0.35	0.03	0.996	0.35	0.03	1
Married	0.65	0.67	-0.02	1	0.64	0.01	1	0.64	0.01	1	0.68	-0.03	0.996
Employed	0.52	0.5	0.01	1	0.55	-0.03	0.996	0.52	0	1	0.55	-0.03	0.998
Citizen	0.81	0.83	-0.01	1	0.84	-0.03	1	0.85	-0.04	0.989	0.84	-0.03	0.998
Religious	0.91	0.87	0.04	0.937	0.89	0.02	1	0.9	0.01	1	0.9	0.01	1
Income	3.41	3.31	0.1	1	3.43	-0.02	0.889	3.28	0.13	0.904	3.4	0.01	0.813
Self-help	0.71	0.62	**0.09****	0.168	0.65	0.06	0.679	0.68	0.02	1	0.66	0.05	0.906
Gov-help	0.91	0.93	-0.02	1	0.9	0	1	0.91	0	1	0.91	0	1
Donated	0.85	0.83	0.02	1	0.83	0.02	1	0.84	0.01	1	0.83	0.02	1
Population growth	15.1	20.9	-5.8	0.604	21.7	**-6.53****	0.725	21.5	**-6.33****	0.5	18.4	-3.3	0.985
HDB	0.78	0.8	-0.02	1	0.85	**-0.07****	0.48	0.84	-0.06	0.746	0.82	-0.04	0.985
Condo	0.16	0.14	0.01	1	0.11	0.05	0.862	0.12	0.04	0.985	0.14	0.02	1
Demographic Change	7.88	8.22	-0.33	0.559	7.27	0.62	0.529	6.81	1.07	0.055	7.46	0.42	0.688
Income inequality	3.4	3.39	0.01	0.997	3.52	-0.12	0.972	3.41	-0.02	0.945	3.49	-0.09	0.995

Notes: *** indicates statistical significance at the 0.01 level and ** at the 0.05 level. We report the means across treatment groups, difference-in-means and corresponding two-sample t-test with unequal variances, and the p-values from a two-sample Kolmogorov-Smirnov (KS) test. We consider a covariate imbalanced if the p-values from both the two-sample t-test and KS test suggest significance at the 5 percent level. The univariate balance diagnostics suggest that there are no observable differences between respondents assigned to each of the motivational frame treatment group and control group, at the 5 percent level of significance.

Table A-3-3: Multivariate Balance Diagnostics: Motivational Frame Treatment Groups

	Pure Altruism	Self-Image	Self-Interest	Impure Altruism
Current volunteer	-0.27	-0.27	-0.33	**-0.66****
Former volunteer	-0.06	0.34	0.39	0.26
Non-volunteer	(omitted)	(omitted)	(omitted)	(omitted)
Age	0	**-0.02****	-0.01	-0.01
Male	-0.34	-0.1	-0.06	-0.03
Chinese	(omitted)	(omitted)	(omitted)	(omitted)
Malay	0.12	0.09	-0.03	0.31
Indian	-0.03	-0.05	0.13	0.42
Other	0.2	0.15	0.41	0.6
Tertiary	-0.04	-0.39	-0.21	0.35
Married	0	0.34	0.02	-0.04
Employed	-0.02	0.15	0.07	0.01
Citizen	0.15	0.36	0.38	0.45
Religious	-0.51	-0.3	-0.26	-0.22
Income	0.02	0.03	0.04	0.02
Self-help	**-0.46****	-0.3	0.35	-0.15
Gov-help	0.41	0.16	0.04	0.1
Donated	0.07	0.14	-0.05	0.08
Population growth	0	0	0	0
HDB	0.45	0.7	0.54	0.45
Condo	0.31	0.44	-0.13	0.05
Demographic Change	0.01	-0.01	-0.01	0
Income inequality	0.04	0.08	0.13	0.06
Region Fixed Effects	Yes	Yes	Yes	Yes
Joint Signifiance Test		0.77		
Wald Chi-Square		88.3		

Notes: *** indicates statistical significance at the 0.01 level and ** at the 0.05 level. We report the results from a formal multivariate balance check a regression of a trichotomous treatment variable that indicates assignment to one of the three treatment groups (control group/pure altruism/self-image/self-interest/impure altruism treatment) on the background covariates. The multivariate balance diagnostics suggest balance overall; the covariates are jointly insignificant at the 5 percent level.

Appendix B-1

B-1-1: Experimental Protocol for Treatment 1
(Self-Interested Frame + Information Package)

Message 1

1. *Good afternoon. I am **[name],** and am here on behalf of the Singapore Civil Defence Force (SCDF). You may know of the fire which broke out on the **4th floor** of your block **on 5 Apr.***

2. *We are conducting a door-to-door visit to share with YOU fire safety tips on how you can keep YOU AND YOUR FAMILY safe. We also want to share with YOU information about how YOU can get involved in SCDF's Community Emergency Preparedness Programme. People with greater knowledge of fire safety are more likely to escape fires unharmed. So we really wanted to speak with you on how YOU can better protect YOURSELF AND YOUR FAMILY from the dangers of fire.*

3. *Could I please ask what you would do if a fire broke out in your apartment while you were at home with your family? Could you briefly describe the actions you would take? [The interviewer should prompt the respondent with further questions if the response is dial 995. Such prompts can take the form of "SCDF is on the way but might not arrive on time".]*

4. *At this point I want to share with you more on the CEPP – it is a programme taught by SCDF which comprises modules like First Aid, CPR & Fire Safety. It is a very useful course because you can attend & learn the essential steps needed to deal with various emergencies.*

5. *Can I ask if you would you be interested to attend the CEPP?(Yes/ No)*

   *[IF Yes]: Thank you for your interest. [Interviewer to hand over schedule of CEPP courses for the coming month] These are the available dates for the coming month at **Queensway/ Tampines Land Division**. Please feel free to enrol at any one of these sessions. We look forward to seeing you there.*

   [IF No ask reasons why and proceed to asking the demographic questions.]

6. *Could you also please us answer some questions related to Emergency Preparedness? Your participation is very important and your identity and the information you provide will be kept strictly confidential. The survey will take about 3 minutes. [To interviewer: Proceed to interview respondent.]*

B-1-2: Experimental Protocol for Treatment 2
(Self-Interested Frame + Preregistration Prompt)

Message 2

1. *Good afternoon. I am **[name],** and am here on behalf of the Singapore Civil Defence Force (SCDF). You may know of the fire which broke out on the **4th floor** of your block **on 5 Apr.***

2. *We are conducting a door-to-door visit to share with YOU fire safety tips on how you can keep YOU AND YOUR FAMILY safe. We also want to share with YOU information about how YOU can get involved in SCDF's Community Emergency Preparedness Programme. People with greater knowledge of fire safety are more likely to escape fires unharmed. So we really wanted to speak with you on how YOU can better protect YOURSELF AND YOUR FAMILY from the dangers of fire.*

3. *Could I please ask what you would do if a fire broke out in your apartment while you were at home with your family? Could you briefly describe the actions you would take? [The interviewer should prompt the respondent with further questions if the response is dial 995. Such prompts can take the form of "SCDF is on the way but might not arrive on time".]*

4. *At this point I want to share with you more on the CEPP – it is a programme taught by SCDF which comprises modules like First Aid, CPR & Fire Safety. It is a very useful course because you can attend & learn the essential steps needed to deal with various emergencies.*

5. *Can I ask if you would you be interested to attend the CEPP?(Yes/ No)*

   *[IF Yes]: Thank you for your interest. [Interviewer to show resident schedule of CEPP courses for the coming month] These are the available dates for the coming month at **Queensway/ Tampines Land Division**. Which of the following dates is good for you [NB: if resident says s/he is unsure/need to check his/her schedule, press them to give a rough date]? Great, here are the following ways you can get to the Land Division.*

   Let me preregister you for the course. [Interviewer to record respondent's FULL NAME, NRIC NUMBER, ADDRESS, and CONTACT NUMBER and pass respondent reminder postcard]

   *Thank you and we look forward to seeing you at the course on **[insert date].** You may be chosen by SCDF for a follow-up call after the CEPP to find out more about your experience. [proceed to asking the demographic questions.]*

6. *Could you also please us answer some questions related to Emergency Preparedness? Your participation is very important and your identity and the information you provide will be kept strictly confidential. The survey will take about 3 minutes. [To interviewer: Proceed to interview respondent.]*

B-1-3: Experimental Protocol for Treatment 3
(Communitarian Frame + Informational Package)

Message 3

1. *Good afternoon. I am **[name],** and am here on behalf of the Singapore Civil Defence Force (SCDF). You may know of the fire which broke out on the **4th floor** of your block **on 5 Apr.***

2. *We are conducting a door-to-door visit to share with RESIDENTS fire safety tips on how they can help keep EVERYONE in the block safe. We also want to share with RESIDENTS information about how EVERYONE can get involved in SCDF's Community Emergency Preparedness Programme. The elderly and young children are more vulnerable to becoming victims of fire. People who live near neighbours with greater knowledge of fire safety were less likely to become victims of fire. So we really wanted to speak with you on how RESIDENTS can better protect THEMSELVES AND THEIR NEIGHBOURS from the dangers of fire.*

3. *Could I please ask what you would do if a fire broke out in your neighbour's apartment while you were at home with your family? Could you tell me the approximate age of your neighbour and the actions you would take? [The interviewer should prompt the respondent with further questions if the response is dial 995. Such prompts can take the form of "SCDF is on the way but might not arrive on time".]*

4. *At this point I want to share with you more on the CEPP – it is a programme taught by SCDF which comprises modules like First Aid, CPR & Fire Safety. It is a very useful course because you can attend & learn the essential steps needed to deal with various emergencies.*

5. *Can I ask if you would you be interested to attend the CEPP?(Yes/ No)*

   *[IF Yes]: Thank you for your interest. [Interviewer to hand over schedule of CEPP courses for the coming month] These are the available dates for the coming month at **Queensway/ Tampines Land Division**. Please feel free to enrol at any one of these sessions. We look forward to seeing you there.*

   [IF No ask reasons why and proceed to asking the demographic questions.]

6. *Could you also please us answer some questions? Your participation is very important and your identity and the information you provide will be kept strictly confidential. The survey will take about 3 minutes. [To interviewer: Proceed to interview respondent.]*

B-1-4: Experimental Protocol for Treatment 4
(Communitarian Frame + Preregistration Prompt)

Message 4

- *Good afternoon. I am **[name],** and am here on behalf of the Singapore Civil Defence Force (SCDF). You may know of the fire which broke out on the **4th floor** of your block **on 5 Apr.***

- *We are conducting a door-to-door visit to share with RESIDENTS fire safety tips on how they can help keep EVERYONE in the block safe. We also want to share with RESIDENTS information about how EVERYONE can get involved in SCDF's Community Emergency Preparedness Programme. The elderly and young children are more vulnerable to becoming victims of fire. People who live near neighbours with greater knowledge of fire safety were less likely to become victims of fire. So we really wanted to speak with you on how RESIDENTS can better protect THEMSELVES AND THEIR NEIGHBOURS from the dangers of fire.*

- *Could I please ask what you would do if a fire broke out in your neighbour's apartment while you were at home with your family? Could you tell me the approximate age of your neighbour and the actions you would take? [The interviewer should prompt the respondent with further questions if the response is dial 995. Such prompts can take the form of "SCDF is on the way but might not arrive on time".]*

- *At this point I want to share with you more on the CEPP – it is a programme taught by SCDF which comprises modules like First Aid, CPR & Fire Safety. It is a very useful course because you can attend & learn the essential steps needed to deal with various emergencies.*

- *Can I ask if you would you be interested to attend the CEPP?(Yes/ No)*

  *[IF Yes]: Thank you for your interest. [Interviewer to show resident schedule of CEPP courses for the coming month] These are the available dates for the coming month at **Queensway/ Tampines Land Division**. Which of the following dates is good for you [NB: if resident says s/he is unsure/need to check his/her schedule, press them to give a rough date]? Great, here are the following ways you can get to the Land Division.*

  Let me preregister you for the course. [Interviewer to record respondent's FULL NAME, NRIC NUMBER, ADDRESS, and CONTACT NUMBER and pass respondent reminder postcard]

  *Thank you and we look forward to seeing you at the course on **[insert date].** You may be chosen by SCDF for a follow-up call after the CEPP to find out more about your experience. [proceed to asking the demographic questions.]*

1. *Could you also please us answer some questions? Your participation is very important and your identity and the information you provide will be kept strictly confidential. The survey will take about 3 minutes. [To interviewer: Proceed to interview respondent.]*

Appendix B-2

Table B-2-1: Summary of Data

	Variable	Description
Dependent Variable	CEPP Interest	Binary variable, coded 1 if respondent was interested to attend the CEPP, 0 otherwise
	CEPP Attendance	Binary variable, coded 1 if respondent attended the CEPP, 0 otherwise
Active Treatments (CEPP Interest)	Self	Binary variable, coded 1 if respondent was assigned to self-interested frame, 0 otherwise
	Community	Binary variable, coded 1 if respondent was assigned to communitarian frame treatment, 0 otherwise
Active Treatments (CEPP Attendance)	Information	Binary variable, coded 1 if respondent was assigned to informational treatment, 0 otherwise
	Preregistration	Binary variable, coded 1 if respondent was assigned to preregistration treatment, 0 otherwise
	Preregistration Compliers	Binary variable, coded 1 if respondent complied with preregistration treatment assignment
Control Treatment	Control	Binary variable, coded 1 if respondent was assigned to control group, 0 otherwise
Demographics	Age	Continuous variable, self-reported age
	Male	Binary variable, coded 1 for males, 0 otherwise
	Chinese	Binary variable, coded 1 for Chinese, 0 otherwise
	Indian	Binary variable, coded 1 for Indian, 0 otherwise
	Malay	Binary variable, coded 1 for Malay, 0 otherwise
	Other	Binary variable, coded 1 for Other races, 0 otherwise
	Secondary	Binary variable, coded 1 for secondary school education or above, 0 otherwise
	Married	Binary variable, coded 1 for married, 0 otherwise
	Citizen	Binary variable, coded 1 for citizens, 0 otherwise
	Inhabitants	Continuous variable, number of inhabitants in household
	Neighborliness	Categorical variable, coded 1for "Go own way", 2 for "Some neighbors help each other, others go own way", 3 for "Help each other"
	Income	Categorical variable, self-reported income bracket
Emergency Preparendess	Aware	Binary variable, coded 1 if aware of CEPP, 0 otherwise
	Readybag	Binary variable, coded 1 if own a readybag, 0 otherwise
	Fireblanket	Binary variable, coded 1 if own a fireblanket, 0 otherwise
	Firehistory	Binary variable, coded 1 if experienced a fire previously, 0 otherwise
	Prepared	Binary variable, coded 1 if "prepared" or "very prepared", 0 otherwise
	SCDFconfidence	Binary variable, coded 1 if "confident" or "very confident", 0 otherwise
	PreviousCEPP	Binary variable, coded 1 if aware of CEPP and attended CEPP, 0 otherwise
	Block 1	Binary variable, coded 1 if Hougang, 0 otherwise
	Block 2	Binary variable, coded 1 if Compassvale, 0 otherwise
	Block 3	Binary variable, coded 1 if Choa Chu Kang, 0 otherwise
	Block 4	Binary variable, coded 1 if Pinnacle, 0 otherwise

Appendix B-3

Table B-3-1: Univariate Balance Diagnostics: Contextual Frame Treatment Groups

	Self-Interested vs. Control				Communitarian vs. Control			
	Self-Interested	Control	Diff-in-Means	KS-Test p-value	Communitarian	Control	Diff-in-Means	KS-Test p-value
Age	40.3	40.65	0.35	0.98	40.1	40.65	0.5	0.931
Male	0.52	0.46	-0.06	0.999	0.64	0.46	-0.18**	0.155
Chinese	0.68	0.8	0.12	0.596	0.7	0.8	0.1	0.915
Malay	0.07	0.09	0.02	1	0.11	0.09	-0.01	1
Indian	0.18	0.07	-0.11**	0.753	0.16	0.07	-0.08	0.671
Other	0.07	0.04	-0.04	1	0.04	0.04	0	1
Secondary	0.85	0.81	-0.04	1	0.9	0.81	-0.09	0.998
Married	0.75	0.8	0.05	1	0.82	0.8	-0.02	1
Citizen	0.79	0.91	0.12**	0.631	0.86	0.91	0.05	0.834
Inhabitants	4.15	4.37	0.22	0.496	4.28	4.37	0.09	0.648
Neighborliness	0.55	0.83	0.28***	0.006***	0.73	0.83	0.11	0.05
Income	5.11	4.9	-0.21	0.466	6.07	4.9	-1.17**	0.06
Aware of CEPP	0.27	0.37	0.1	0.814	0.28	0.37	0.09	1
Readybag	0.24	0.39	0.15	0.353	0.18	0.39	0.20***	0.06
Fireblanket	0.22	0.35	0.14	0.442	0.27	0.35	0.08	0.97
Firehistory	0.07	0.17	0.09	0.865	0.1	0.17	0.07	0.956
Prepared	0.52	0.63	0.11	0.743	0.54	0.63	0.09	0.985
SCDF Confidence	0.87	0.83	-0.04	1	0.85	0.83	-0.02	0.987
Previous CEPP	0.08	0.15	0.07	0.994	0.11	0.15	0.04	1
Block1	0.24	0.22	-0.02	1	0.31	0.22	-0.09	0.999
Block2	0.25	0.22	-0.03	1	0.19	0.22	0.03	1
Block3	0.24	0.2	-0.04	1	0.18	0.2	0.2	1
Block4	0.26	0.35	0.09	0.897	0.31	0.35	0.04	0.97

Notes: *** indicates statistical significance at the 0.01 level and ** at the 0.05 level. We report the means across treatment groups, difference-in-means and corresponding two-sample t-test with unequal variances, and the p-values from a two-sample Kolmogorov-Smirnov (KS) test. We consider a covariate imbalanced if the p-values from both the two-sample t-test and KS test suggest significance at the 5 percent level. The univariate balance diagnostics suggest that with the exception of the neighborliness covariate, there are no observable differences between respondents assigned to the self-interested frame treatment group and control group, at the 5 percent level of significance.

Table B-3-2: Multivariate Balance Diagnostics: Contextual Frame Treatment Groups

	Self-interested	Communitarian
Age	-0.02	-0.03
Male	0.21	0.36
Chinese	-0.73	1
Malay	-1.89	0.34
Indian	-0.36	1.2
Other	(ommited)	(ommited)
Secondary	1.62**	2.60**
Married	0.06	0.74
Citizen	0.64	0.88
Inhabitants	-0.2	-0.06
Neighborliness	-0.23	0.54
Income	-0.07	0
Aware of CEPP	-0.44	-0.52
Readybag	0.43	-0.08
Fireblanket	-0.71	-0.61
Firehistory	-1.4	-10.8
Prepared	0.1	0.27
SCDF Confidence	0.69	0.39
Previous CEPP	1.03	1.24
Block1	-1.65	-1.53
Block2	-0.54	-0.56
Block3	-1.62	-1.9
Block4	(ommited)	(ommited)
Joint Signifiance Test	0.147	
Wald Chi-Square	51.61	

Notes: *** indicates statistical significance at the 0.01 level and ** at the 0.05 level. The multivariate balance diagnostics suggest no significant covariate imbalance — with the exception of the secondary education variable, none of the covariates are individually significant, and the covariates are jointly insignificant.

Table B-3-3: Univariate Balance Diagnostics: Follow-Through Prompt Treatment Groups

	Informational vs. Control				Preregistration vs. Control			
	Self-Interested	Control	Diff-in-Means	KS-Test p-value	Communitarian	Control	Diff-in-Means	KS-Test p-value
Age	39.6	40.65	1.02	0.957	40.45	40.65	0.2	0.942
Male	0.53	0.46	-0.07	0.997	0.56	0.46	-0.10	0.882
Chinese	0.67	0.8	0.13	0.624	0.68	0.8	0.12	0.703
Malay	0.11	0.09	-0.01	1	0.03	0.09	0.06	1
Indian	0.16	0.07	-0.09	0.934	0.24	0.07	-0.17***	0.3
Other	0.06	0.04	-0.03	1	0.06	0.04	-0.02	1
Secondary	0.97	0.89	-0.09	0.957	0.96	0.89	-0.07	0.998
Married	0.76	0.8	0.04	1	0.85	0.8	-0.05	1
Citizen	0.84	0.91	0.07	0.999	0.74	0.91	0.17**	0.305
Inhabitants	4.15	4.37	0.22	0.917	4.31	4.37	0.06	0.797
Neighborliness	0.66	0.83	0.17***	0.282	0.65	0.83	0.19**	0.215
Income	5.99	4.9	-1.09	0.194	5.57	4.9	-0.67	0.052
Aware of CEPP	0.25	0.37	0.12	0.708	0.25	0.37	0.12	0.737
Readybag	0.28	0.39	0.11	0.776	0.2	0.39	0.19**	0.158
Fireblanket	0.24	0.35	0.11	0.767	0.24	0.35	0.11	0.78
Firehistory	0.06	0.17	0.1	0.841	0.06	0.17	0.11	0.799
Prepared	0.53	0.63	0.1	0.884	0.51	0.63	0.12	0.68
SCDF Confidence	0.84	0.83	0	1	0.9	0.83	-0.07	0.998
Previous CEPP	0.08	0.15	0.07	0.993	0.04	0.15	0.11	0.839
Block1	0.23	0.22	-0.01	1	0.21	0.22	0.01	1
Block2	0.24	0.22	-0.02	1	0.24	0.22	-0.02	1
Block3	0.19	0.2	0.01	1	0.21	0.2	-0.01	1
Block4	0.34	0.35	0.01	1	0.34	0.35	0.01	1

Notes: *** indicates statistical significance at the 0.01 level and ** at the 0.05 level. We report the means across treatment groups, difference-in-means and corresponding two-sample t-test with unequal variances, and the p-values from a two-sample Kolmogorov-Smirnov (KS) test. We consider a covariate imbalanced if the p-values from both the two-sample t-test and KS test suggest significance at the 5 percent level. The univariate balance diagnostics suggest that there are no observable differences between respondents in the informational treatment group and control group, or the preregistration treatment group and control group, at the 5 percent level of significance.

Table B-3-4: Univariate Balance Diagnostics: Follow-Through Prompt Treatment Groups

	Informational	Preregistration
Age	-0.04	-0.01
Male	0.03	0.57
Chinese	-0.64	-0.08
Malay	-0.99	-2.32
Indian	-0.01	0.56
Other	(ommited)	(ommited)
Secondary	2.71**	2.09**
Married	0.12	0.42
Citizen	0.92	-0.17
Inhabitants	-0.24	0.18
Neighborliness	0.41	0.36
Income	0	-0.13
Aware of CEPP	-0.79	-0.68
Readybag	0.91	0.42
Fireblanket	-0.74	-0.81
Firehistory	-1.65	-1.92
Prepared	-0.04	-0.33
SCDF Confidence	0.16	1.11
Previous CEPP	1.85	0.82
Block1	-2.28**	-3.22**
Block2	-0.89	-1.58
Block3	-2.25**	-2.83**
Block4	(ommited)	(ommited)
Joint Signifiance Test	0.086	
Wald Chi-Square	55	

Notes: *** indicates statistical significance at the 0.01 level and ** at the 0.05 level. We report the results from a formal multivariate balance check — a regression of a trichotomous treatment variable that indicates assignment to one of the three treatment groups (control group/informational treatment/preregistration treatment) on the background covariates. The multivariate balance diagnostics suggest some covariate imbalance. The secondary education variable and the apartment dummy variables are significant for both the informational and preregistration treatments. The covariates, however, are jointly insignificant at the 5 percent level (see Table 12b).

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