Are mere instructions enough? Evaluation of four types of messaging on community depot recycling

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Running Head: Messaging Effects on Depot Recycling

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Abstract

Curbside recycling efforts have made an important contribution to waste containment, but many communities have specific limitations on what products can be recycled within their community bins (e.g., no cartons, Styrofoam, soft plastics) and must rely on depots for recycling these other items. These specialty depots typically take the form of local community or large central municipal sites. The purpose of this randomized trial was to examine messages targeting 1) awareness/instructions, 2) utility, 3) affect, and 4) planning upon community and central depot recycling across eight weeks. One hundred and seventy-six community-dwelling residents between the ages of 18-65 years who self-identified as having the potential to improve their depot recycling activities completed baseline recycling measures and then were randomly assigned to one of the four messaging conditions. One hundred and forty-four of these participants subsequently answered follow-up recycling behavior measures four and eight weeks later. Intention to treat analyses showed that depot recycling increased significantly from baseline to four weeks. The effect waned for community recycling while holding for municipal depot recycling at eight weeks. Distance to recycling depot (closer proximity resulted in greater community recycling), access to a car (low access resulted in greater community recycling), and baseline recycling behavior (no prior recycling resulted in greater behavior change) all acted as significant moderators of the effect. There was no time by group interaction among conditions. The findings support the use of basic instructions – as a minimum – for promoting depot recycling efforts and provide evidence that local community depots, in conjunction with municipal depots, are important to increasing recycling behavior.

Key Words: Persuasive communication, Affective messaging, Cognitive messaging, planning messaging, messaging strategies

1. Introduction

With the rising global population and an increasing consumption of manufactured goods, environmental problems in waste containment become more problematic with each passing year. The severity of this problem on quality of life has been well documented (Oskamp, 2000; Vlek & Steg, 2007). For example, Canadian households produce 13.4 million tonnes of waste (418 kg per person) and 75% of this is sent to landfill (Statistics Canada, 2004, 2013).

Clearly recycling is an essential element of any long-term solution in waste control, and how to motivate full participation in recycling programs becomes of critical concern to policy makers. Large scale policies that involve corporate leadership and make recycling easy and rewarding have shown considerable success in the last few decades (Statistics Canada, 2004). For example, the results of a recent meta-analysis indicate that curbside recycling, when made easy and convenient through close proximity and straightforward containment storage containers, has been shown to have an enormous effect (d = 2.33) on recycling efforts in a community setting (Osbaldiston & Schott, 2012). This is very promising, yet many communities do not have curbside recycling programs (Statistics Canada, 2004). Furthermore, many products, such as organic waste, styrofoam, and soft plastics are not eligible in many curbside community recycling programs at present. This places the burden of recycling at the level of the individual who must collect, bag, transport, and often pay for recycling. Low-cost attempts to influence an individuals' behavior to recycle at depots are thus still very important to the overall goal of waste management.

Unfortunately, in comparison to curbside recycling and public recycling (i.e., casually recycling while at a public place), very little is known about the success of depot recycling intervention efforts (Sidique, Lupi, & Joshi, 2010). For example, in the Osbaldiston and Schott

(2012) meta-analysis, over 90 intervention studies were reported to be conducted on the former while we were unable to find any experimental studies on community-based depot recycling. Furthermore, the successful strategies used in curbside and public recycling, such as making it as simple as possible and providing rewards (Statistics Canada, 2004) are the actual drawbacks of depot recycling where people must transport and pay for their recyclables (Sidique et al., 2010).

With manipulations of ease and reward not applicable to most depot recycling, low-cost messages to spark behavior change form the purpose of this study. Specifically we examine four types of messages that have shown promise in the recycling behaviour change domain (Bamberg & Möser, 2007; Osbaldiston & Schott, 2012). From a theoretical standpoint, social cognition theories, such as Ajzen's (1991) theory of planned behavior, that position motivation as a consequence of attitude (evaluation of a behavior), subjective norm (perceived pressure to perform a behavior) and perceived behavioral control (ability to perform the behavior) have performed well when understanding recycling (Bamberg & Möser, 2007). Prior research on general public recycling has shown that messages that approach the global utility and socially responsible impetus to recycle have a modest effect on behavior (d = .28) (Osbaldiston & Schott, 2012).

Still, depot recycling is often remote from communities and not well advertised. It may be that simple awareness of recycling depots and the products they recycle is the much needed message for many community residents. According to McGuire's (1984) hierarchy of effects model, basic awareness is the critical antecedent to attitude and eventual behavior change. In support of this supposition, a study that evaluated the effect of simple instructions on community recycling found a large effect over baseline across time that was similar to a rewards-based approach (d = 2.88) (Iyer & Kashyap, 2007). Other instruction-based approaches have yielded

similar results (Kim, Oah, & Dickenson, 2005). This suggests that mere procedural knowledge may be a critical impetus to form action in depot recycling. The finding is interesting, but highlights the need for application and subsequent examination.

On the other side of procedural knowledge and social cognitions is an emergent literature demonstrating the importance of planning in order to facilitate behavior change (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006). From a theoretical standpoint, the premise follows that regulatory skills are required to tie motivation to subsequent behavior (Gollwitzer & Sheeran, 2006; Schwarzer, 1992). Thus, people may be aware of recycling depots and have a positive attitude about recycling but they have not formed a plan of action; here planning messages – focused on how to plan recycling behavior effectively – are the necessary communication. These include but are not limited to the specifics of a behavioral plan (e.g., what, when, where, with who) and the problem solving and monitoring of behavioral action. In support of this theorizing, four studies on public recycling that involved some form of planning resulted in a modest effect size ($d = .50$) in comparison to baseline measurement (Osbaldiston & Schott, 2012). The effect of pure planning, when not combined with other persuasive materials, however, has not been examined in depot-based recycling at present.

While utility and social responsibility-based messages, basic instructions, and planning have all seen some attention in the recycling literature, a paucity of literature is available on affective-based messages that attempt to persuade people to recycle based on the feelings of satisfaction, pleasure and pride (Osbaldiston & Schott, 2012). From a theoretical standpoint, the affective domain, by tradition, has been neglected in comparison to utility-based social cognition models (Van der Pligt, Zeelenberg, van Dijk, de Vries, & Richard, 1998; Zanna & Rempel, 1988). Nevertheless, hedonic theory (Higgins, 1997; Kahneman, 1999) and other models such as

Deci and Ryan's (1985) self-determination theory place affective considerations as prime antecedents for sustained behavioral action. The predictive effects of affect over and above utility/instrumental based attitude and social norms in recycling has been shown in correlational research (Smith, Haugtvedt, & Petty, 1994), but the experimental effect still requires attention.

Therefore, the purpose of this randomized trial was to examine the effectiveness of messages targeting awareness/instructions, utility, affect, and planning upon depot recycling across eight weeks in a community setting. The study also examined two types of depot recycling behaviors: local community depots that have the advantage of being proximal to the community yet the disadvantage of restricted hours, and a large municipal central recycling depot removed from neighborhood communities yet possessing very open hours of operation. We hypothesized that all conditions would improve recycling behavior from baseline. In addition, though tentatively, we also hypothesized that the planning and affective conditions would result in larger changes to recycling behavior than the simple instructions or utility messages. This follows the premise that people are more likely to act on their affective attitudes or to use the planning messages to tie motivation to behavior than mere instructions and that the utility of recycling is already well-understood from regular curbside recycling behavior. We also explored three potential moderators of intervention effectiveness: baseline recycling experience, access to a car, and proximity to the nearest recycling depot. We hypothesized that participants who had not performed depot recycling before would be more influenced by the intervention than participants who already did some depot recycling, because the group would have greater variability for behavior change. Finally, we hypothesized that convenience factors such as living near the depot and having access to a car would result in greater chances of

changing behavior compared to those who lived farther away from the depots and had no car to transport the recyclables.

2. Method

2.1 Study Design and Participants

A randomized trial was conducted with outcome measurements at baseline, four weeks, and eight weeks post-intervention. Primary outcome measures were the self-reported number of trips to central municipal depot recycling (identified by the name of the depot), and the number of trips to local community-based recycling depots (identified by locations). Initial respondents were 220 community-dwelling residents (one respondent per household) between the ages of 18-65 years who self-identified as having the potential to improve their depot recycling activities. Respondents were provided with a baseline questionnaire package and 44 participants declined to participate further due to lack of interest (see Figure 1). The remaining 176 participants were randomly assigned to 1) a standard instructions condition (n = 34), 2) a group that received instructions and messages targeting the utility of depot recycling (n = 48), 3) a group that received instructions and messages targeting the affective benefits of depot recycling (n = 49), and 4) a group that received instructions and directions on how to set plans to perform depot recycling (n = 45).

Randomization was concealed until actual exposure to the intervention. Recruitment, randomization to groups and (e)mailing/contact with participants was performed by an independent research assistant. The researchers were blind to the assigned study condition during the intervention period. The study was approved by the first author's IRB and all participants provided initial and ongoing informed consent (at follow-ups) during participation.

2.2 Procedure

Potential participants were invited to take part in the study by means of door to door recruitment in the Capitol Region District of British Columbia. Specifically, the sampling frame consisted of residents who lived within a 2km radius of nine specialized community recycling depots. These depots recycle material that was not eligible to be included within regular curbside recycling at the time of the study such as styrofoam, batteries, and soft-plastics. The depots were available from approximately 9am-12:00pm every fourth Saturday (i.e., once a month) within the communities and recycling of this specialized material included a fee per amount of waste that iss deposited (approx $4-6 CDN per bag). Recruitment in this fashion was ongoing from March, 2012 until November, 2012. Recruitment started five-weeks before the community recycling time.

Interested participants were instructed on the study purpose, elements, inclusion criteria and the randomization procedure was explained. Participants provided informed consent, their name and their email address (100% of participants had email and internet access), and were then handed an instruction sheet that provided a questionnaire URL link to the online baseline questionnaire. One week after recruitment, participants who had not yet completed the baseline measures were sent an email reminder and the link to the questionnaire. Within one week of completion of the baseline questionnaire, Participants were randomized to one of the four conditions, with the respective materials associated with each condition sent to the resident's home.

Participants were asked to read the material/follow the instructions. At 4 weeks (i.e., immediately after the available local depot recycling opportunity), the follow-up questionnaire link was mailed to participants as well as an additional copy of the same intervention materials and instructions corresponding with their randomized package. This included similar measures to

the baseline questionnaire and an email reminder prompt was provided to those who had not completed the follow-up questionnaire one week later. Finally, at eight weeks (i.e., immediately after the available local depot recycling opportunity) a final questionnaire link containing similar measures to baseline and four weeks and process evaluation information (i.e., use of the material provided, usefulness, barriers to use) was emailed to participants. Again respondents who did not complete their follow-up questionnaire within a week received an email reminder (Dillman, 1983). The participants received a thank you letter after completion of the follow-up questionnaire.

2.3 Intervention

The standard instruction package consisted of information about the definition of depot recycling compared to curbside recycling in order to orient participants to the questions being asked in the questionnaire, followed by the types of products that can be recycled at these depots. This included soft plastics (grocery bags, cereal bags, shrink/over wrap), styrofoam (cups, containers, insulators), electronics, and hard plastics. The recycling centre locations (these included the community depot as well as the central municipal depot) and times available were subsequently provided.

The utility-based condition received the standard instructions as well as a three page color fold-out brochure with pictures. The header exclaimed “Environmental benefits to recycling!” and included arguments for recycling around natural resource conservation, landfill reduction, energy conservation via recycling, reduced manufactured goods from raw materials and air pollution reduction (Pennsylvania Department of Environmental Protection, 2005).

The affective condition received the standard instructions as well as a three page color fold-out brochure with pictures. The header exclaimed “It feels good to recycle!” and included

arguments for recycling around feeling good such as protecting the environment, not harming animal life, keeping British Columbia beautiful, benefits to children and that it's an enjoyable community event to recycle at depots.

Finally, the planning-based condition received the standard instructions as well as a three page color fold-out brochure with pictures. The header exclaimed "Keeping up with recycling!" and included instructions for recycling around how it will be transported to the depot (car, bike, transit, walking), who will drop off the materials (myself, with a family member, with a friend), a memory prompt to place the event in the calendar/smartphone, and what time the recycling will be transported. The material for planning was based on several streams of prior work including action planning, problem solving barriers akin to coping planning and traditional goal setting (Locke & Latham, 1990; Sniehotta, Scholz, & Schwarzer, 2005, 2006; Strecher et al., 1995).

Arguments/points for all three fold-out brochures were phrased as gain-framed (i.e., positive advantages) based on past recycling research (Lord, 1994). Furthermore, the frame was written in individualized/personalized statements, and photographs accompanied text on each topic covered based on supportive research for text and images in recycling behavior (Kim et al., 2005). Detail and format (font size, number of points made) were matched across all three brochures. The design of all material was created for this study. Full materials are available in appendix A.

2.4 *Measurement*

The questionnaire asked for a contact resident to complete all measures on behalf of the members of the residence across the study. This was deemed necessary to aid in consistency across measurement although it may bias (downward) the estimates of total recycling. Basic demographic measures resembled those asked in Canadian census questions and included age,

sex, ethnicity, education, family income, marital status and employment status. Additional health status indicators were also included because the local depots could include walking, lifting, or cycling. Finally, we gathered information of approximate distance from the local depot, residence, and access to an automobile.

Depot Recycling Behavior. For the measurement of depot recycling, we clarified participants with regard to their recycling of styrofoam, polycarbonate, acrylic, plexiglass, polypropylene, ABS plastic, soft/film & hard/rigid plastics, foil-lined bags, non-refundable drink cartons and tetra paks, as well as all electronics, ballasts and automotive batteries and not curbside recyclables. There is no validated self-report measure for depot-based recycling so we adapted from the measures of Nigbur et al. (2010) and Barr (2007). The central municipal recycling depot has open availability seven days per week 8:30am to 5:00pm and thus we asked participants "How often during the last four weeks have you delivered your materials to the Ellice Recycle Depot?" from 0 (never) to 7 (every week). For the local community specialized recycling, we specified we were asking about using the local recycling depots (available on Saturdays in Victoria) and asked participants "How often during the last four weeks have you used the Pacific Mobile local recycling depots?" with an open response format for number of times. Given that community depots are staggered (available on different Saturdays throughout the city), we left this an open response format because people could use different depots across the four week period and recycle up to five times in any given month.

2.5 Analysis

Descriptive statistics were used to describe the study population. Point-biserial correlations, t-tests, and chi-square tests of proportions were conducted to test for selective drop-out (coded 0/1/2/3) and equality of study groups at baseline. Repeated measures analyses of

variance were used to test the primary outcome variables across time by group. Probability alpha was set $p < .05$; the study (time x group) was powered to detect a small effect size ($f = .10$) with a power of .80 (Cohen, 1992) and considering a correlation between measures of $r = .80$. An intention to treat (ITT) analysis was conducted using a baseline carried forward procedure to substitute missing values at posttests[1].

3. Results

3.1 Participant Flow

The 176 participants who met the study inclusion criteria and completed the baseline questionnaire package were randomly assigned to one of the four conditions (Figure 1). Ninety-six percent of the affective-based message group, 88 percent of the utility-based message group, 80 percent of the planning-based message group, and 97 percent of the standard instructions group completed the four-week questionnaire package. Furthermore, of these, 98 percent of the affective-based message group, 93 percent of the utility-based message group, 92 percent of the planning-based message group, and 79% percent of the standard instructions group completed the eight-week follow-up questionnaire package. These attrition numbers were not significantly different ($p > .05$) across the groups and amounted to an overall attrition rate of 18%. Those who did not respond at follow-up, however, reported lower baseline recycling at the central municipal depot ($r = .17$, $p < .05$), and were more likely to be male ($r = .20$. $p < .05$) compared to those who completed the study. The interaction between baseline variables, missingness, and group assignment, however, was not significant.

3.2 Baseline Characteristics of Respondents

Baseline characteristics of the participants can be found in Table 1. There were no significant differences among the groups on demographic, health, or environmental variables,

supporting the randomization procedure. Contact residents tended to be in their late 40s/early 50s, typically female, mainly white, commonlaw/married, and employed. Just over half of the sample reported having a college degree and were above the median household income for the Greater Victoria region (Statistics Canada Website, 2010). The participants reported generally good health and had a mean BMI at the borderline of the overweight range (World Health Organization, 2013) . In terms of environmental characteristics, participants primarily lived in detached housing, used a car for transportation, and half lived within 3 km of a recycling depot. Finally, 100% of participants used curbside recycling and most participants had engaged in some, but low volume, local community (M = 0.99 to 1.54 bouts) and central (M = 0.59 to 0.65 bouts) depot recycling in the past four weeks. All primary outcome measures of recycling behavior displayed distributions within the normal range (e.g., skewness < 2.00).

3.3 Exposure to the Intervention

In terms of an intervention manipulation and exposure check, 91% of participants reported reading the brochure content and this was not significantly different by condition. Of the participants who read the material, 95.3% rated it as important (15.9% very important, 42.9% important, 36.5% somewhat important). Seventy-one percent of the sample reported that the brochure helped them improve their recycling behavior, but only 56 percent of the sample reported that the information contained new information to them. There were no differences by group assignment on these responses ($p > .05$).

3.4 Effects on Behavior

Results of the intervention on the primary outcomes can be found in Table 2. The intervention resulted in a significant time effect for both measures of local community and central municipality depot recycling behavior when baseline to four weeks measures were

compared in multivariate repeated measures analysis of variance (Wilk's $\lambda = 0.77$, $F_{2,171} = 24.91$. $p < .01$, $\eta^2 = .23$). Follow-up univariate repeated measures analyses of variance supported the increase in recycling across time for both the local community ($F_{1,172} = 12.19$. $p < .01$, $\eta^2 = .07$) and the central depot ($F_{1,172} = 34.48$. $p < .01$, $\eta^2 = .17$) recycling behavior. The group effect and group by time interaction were not significant ($p > .05$; $\eta^2 < .02$).

For the analyses of baseline to eight weeks, multivariate repeated measures analyses of these results again showed increases in recycling (Wilk's $\lambda = 0.66$, $F_{2,171} = 44.19$. $p < .01$, $\eta^2 = .34$), yet follow-up univariate tests showed this effect was underpinned by the significant time effect in central municipal depot recycling ($F_{1,172} = 88.74$. $p < .01$, $\eta^2 = .34$) but not local community depot recycling ($F_{1,172} = 0.01$. $p > .05$, $\eta^2 = .00$). The group effect and group by time interaction were not significant ($p > .05$; $\eta^2 < .02$).

3.5 Exploratory Moderators

Three potential moderators were explored on the primary outcomes. These included baseline recycling (coded: 0 = none at baseline; 1 = some at baseline), distance to recycling depot (coded: 1 = 1 km or less; 2 = > 1 km), and use of an automobile for recycling (coded: 1 = no, 2 = yes).

Results of the factorial repeated measures analyses supported a time effect for initial behaviour during the baseline to four week phase for both the community and municipal depots (local community depot $F_{1,172} = 5.26$. $p < .05$, $\eta^2 = .03$; municipal depot $F_{1,172} = 48.69$. $p < .01$, $\eta^2 = .23$). In addition, a time effect was identified in the baseline to eight week phase for the municipal depot ($F_{1,172} = 28.44$. $p < .01$, $\eta^2 = .15$), but not the community depot ($p > .05$; $\eta^2 < .01$). Univariate analyses identified that participants who had not performed depot recycling at baseline (local community depot M difference $_{\text{baseline to four-weeks}}$ +1.77; paired $t = 3.80$, $P < .01$;

municipal depot M difference $_{\text{baseline to four-weeks}}$ + 0.84; paired t = 9.80, p < .01; municipal depot M difference $_{\text{baseline to eight weeks}}$ + 1.17; paired t = 11.19, p < .01) had larger increases across time compared to participants who had recycled previously (local community depot M difference $_{\text{baseline to four-weeks}}$ +0.54; paired t = 1.66, p > .05; municipal depot M difference $_{\text{baseline to four-weeks}}$ + 0.19; paired t = 1.69, p > .05; municipal depot M difference $_{\text{baseline to eight weeks}}$ +0.23; paired t = 1.88, p > .05). No significant effects by group were identified for this potential moderator (p > .05; η^2 <.02).

Having a car showed a significant time effect for baseline to four weeks ($F_{1,172}$ = 3.52. p < .05, η^2 = .03) and baseline to eight weeks ($F_{1,172}$ = 7.53. p < .05, η^2 = .05) on local community depot recycling but not on municipal depot recycling (p > .05). Univariate analyses identified that participants who did not have access to a car (M difference $_{\text{baseline to four-weeks}}$ + 2.35; paired t = 3.11, p < .01; M difference $_{\text{baseline to eight weeks}}$ + 2.28; paired t = 3.26, p < .01) had larger increases across time compared to participants who had a car (M difference $_{\text{baseline to four-weeks}}$ + 0.45; paired t = 1.34, p > .05; M difference $_{\text{baseline to eight weeks}}$ +0.56; paired t = 1.30, p > .05). No significant effects by group were identified for this potential moderator (p > .05; η^2 <.02).

Finally, a significant time effect for distance to the nearest recycling depot was identified for baseline to four weeks for community-based depot recycling ($F_{1,172}$ = 3.56. p < .05, η^2 = .03) but not on municipal depot recycling, community recycling baseline to eight weeks, or a group by time effect (p < .05; η^2 <01). Univariate analyses identified that participants who lived within 1 km of the depot (M difference + 1.50; paired t = 2.46, p < .05) had larger increases across time compared to participants who lived further away (M difference + 0.30; paired t = 0.75, p > .05).

4. Discussion

With the rising level of waste and decreasing landfill space, recycling efforts have made an important contribution to waste containment. Curbside recycling has been a very successful effort at the neighborhood level, because of the ease of enacting the behavior. Nevertheless, many communities have specific limitations on what products can be recycled within their community bins (e.g., no cartons, styrofoam, soft plastics, etc.) and must rely on depots for recycling these specialty items. Therefore, the purpose of this randomized trial was to examine messages targeting 1) awareness/instructions, 2) utility, 3) affect, and 4) planning upon depot recycling across eight weeks in a community setting. The study also featured an examination of two types of depot recycling behaviors: local community depots and a large municipal central recycling depot.

Our first hypothesis was that all of the message conditions would have some effect on depot recycling behavior when compared to baseline. Our findings show support for this hypothesis. At four-weeks, both local community depot recycling and recycling at the municipal depot increased by approximately one trip compared to baseline. This was also supported in the process evaluation, where over two thirds of participants reported recycling more as a result of receiving the interventions. The finding is similar to prior research on messaging and community recycling efforts (Osbaldiston & Schott, 2012) but it extends this work by including an affective condition and most importantly by focusing on depot recycling, which had not seen research attention.

The longevity of this effect, however, appeared to wane overall by eight weeks for local community recycling but it persisted with a similar effect for central municipal recycling. Our exploratory moderator analyses helped shed some light on what may have been happening over time at the community depots. Contrary to our hypotheses, those people who did not have access

to a car used the community recycling more than those who had a car and continued to use it at eight weeks. Although we originally surmised that having a car would make transport easier and thus facilitate recycling efforts, upon reflection, the finding lends support to the importance of community recycling depots for people to have access to recycling. It is possible that participants with cars used the municipal depot more from four to eight weeks due to the convenience of its open hours of operation, but people without cars continued to rely on the local depot. Proximity to recycling opportunities is an established antecedent to recycling (Brothers, Krantz, & McClannahan, 1994; Ludwig, Gray, & Rowell, 1998) and this has been supported in depot-based surveys (Sidique et al., 2010). In support of this conjecture, we also found that participants who lived closer to the local depots (within 3 km) used them significantly more than people living further away. Overall, the results support the utility of these small community recycling depot efforts in conjunction with larger municipal depots.

Our other exploratory analysis showed that participants who had not performed depot-based recycling were the most affected by the message conditions in comparison to participants who had done some recycling in the past. This finding supported our hypotheses and follows the law of initial values (Krauth, 2000), where those who have the most room for change are the most able to show changes (Iyer & Kashyap, 2007). Interestingly, our baseline assessment showed that 33.5% of participants reported never using the community depots and 65% of the sample reported never using the municipal depot. Thus, a sizeable proportion of the sample were neophytes to depot-based recycling. Overall, the findings from this study support that an inexpensive pamphlet on depot recycling may be of good benefit to increasing depot recycling efforts, although many residents may be aware and already actively engaging in depot recycling.

Of course, the purpose of constructing four different message conditions was to evaluate whether specific pamphlet content (i.e., instructions, utility, affective, planning) had differential effects on depot recycling. We hypothesized that the planning and affective conditions would result in larger changes to recycling behavior compared to the simple instructions or utility messages. We saw no support for this hypothesis. Indeed, even among our moderator analyses (presence of a car, distance from depot, initial baseline recycling) there were no time x group effects. This suggests that the act of receiving instructions was likely the base intervention needed to prompt increased depot recycling behavior. It should be noted that planning, utility, and even simple instructions have been effective in increasing general recycling in the past (Osbaldiston & Schott, 2012) and affective messaging has shown strong effects in other behavioral domains (Conner, Rhodes, Morris, McEachan, & Lawton, 2011). Nevertheless, these different messages clearly had no differential effect on depot-based recycling behavior similar to some prior recycling studies with multiple message conditions yet similar increases across time (e.g., De Young et al., 1995; Iyer & Kashyap, 2007).

One reason for the lack of group by time effect may have been the unique nature of promoting depot recycling among a group of regular curbside recyclers. Messages about the utility of recycling, the feeling states of recycling, and even the planning behaviors to produce recycling are necessitated on the premise that participants need to be persuaded (Ajzen, 1991) or learn how to recycle (Gollwitzer, 1999). In this context of depot-based recycling, however, all of the participants were already curbside recyclers, thus showing that they support recycling and know how to plan for curbside recycling day. Theoretically, the group may have had little change in terms of recycling motivation or volition; the instructions to recycle material at local/municipal depots may have been all that was required to shift to depot recycling. The

finding is akin to a regular exerciser who is asked to shift their exercise routine rather than someone who is inactive and trying to adopt exercise. The exposure evaluation in the study showed some evidence for this possibility, as almost all participants thought the study information was important, but considerably less suggested it was new information. Thus, our study differs from "true control" designs that observe recycling behavior without prompting recycling in the comparison group either 1) with a message or 2) with measurement (Austin, Hatfield, Grindle, & Bailey, 1993; De Young et al., 1995). Future research may be able tease out this effect with a sample of participants who are not curbside recyclers; however, our study retained the ecological validity of the neighborhoods in the greater Victoria district, where curbside recycling is commonplace. Furthermore, receiving basic instructions is likely the most rigorous comparison for other more advanced messages as this should be considered standard practice now that most early research has shown that some minor intervention is superior to no intervention (Osbaldiston & Schott, 2012).

Despite the unique focus on depot-based recycling and the longitudinal experimental design, our findings need to be considered within the context of limitations. First, we employed a self-report measure of depot recycling that may provide bias and be subject to social desirability. Self-report measures of recycling have shown validity when compared to direct observation (Lingard, Gilbert, & Graham, 2001; Nigbur et al., 2010) and depot-based recycling is such a discrete act that it is unlikely to be prone to severe memory bias. Still, follow-up validation of our findings with observed behavior would be prudent. Second, our sample of participants is limited to respondents who were interested in the study topic. The sample matched the education, health, income, and marital status of residents in greater Victoria (Statistics Canada, 2007) but we clearly had a bias in favor of respondents who were female, Caucasian, and practised

recycling generally (Statistics Canada, 2004). Our results may not generalize to other regions, population groups, and across disparate socioeconomic situations or levels of literacy. Finally, our time frame of eight weeks is short to understand depot recycling; a behavior that relies on sustained action. The results suggested that some decline, particularly with local depot efforts was present after the first opportunity to recycle compared to the second opportunity. A longer follow-up would be informative to track whether the messages are sufficient for sustained behavior change.

5. Conclusions

In summary, depot-based recycling of speciality materials increased across four weeks as a result of basic instructions of what materials these depots take, where they are located and their operating hours. The effect waned over eight weeks in local community depots but it was sustained at the central municipal depot. Interestingly, distance to recycling depot (closer proximity resulted in greater community recycling), access to a car (low access resulted in greater community recycling), and baseline recycling behavior (no prior recycling resulted in greater behavior change) all acted as significant moderators of the effect, but additional arguments about the utility of recycling, the positive feelings attained from recycling, or the technique of how to plan for recycling had no differential value. The findings support the practice of basic instructional pamphlets on increasing recycling at regional and larger central depots.

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Footnote 1. Complete case analyses were also conducted but they yielded similar results to the intention to treat analyses. Thus, we have chosen to report the most conservative missing data strategy within this paper.

Table 1
Demographic, Neighbourhood and Health Profile at Baseline

Characteristic	Affective Group (N = 49)	Instrumental Group (N = 48)	Regulatory Group (N =45)	Instructions Group (N =34)
Demographic Profile				
% Female	56.8	59.1	65.9	66.7
Mean Age (SD)	45.28 (13.64)	51.89 (13.18)	50.32 (10.99)	49.33 (11.85)
% Visible Minority	8.1	2.4	3.1	5.8
% Completed University	54.5	56.5	62.5	56.7
% Married/common-law	72.7	78.3	73.7	64.3
% > $75,000 Household Income	59.5	51.3	66.7	53.8
% Currently Employed	67.4	71.7	68.4	80.0
Health Profile				
Overall Health Appraisal (SD)	3.48 (0.93)	3.83 (0.88)	3.68 (0.88)	3.22 (1.31)
Mean BMI (SD)	25.18 (5.22)	25.30 (4.13)	22.02 (3.81)	23.85(4.16)
%Smoker	2.2	8.7	9.8	11.1
% with Heart Disease	4.9	2.2	0.0	0.0
% with Diabetes	4.9	4.4	2.4	8.8
% with Cancer	7.0	15.6	2.5	8.8
% with High Blood Pressure	4.7	17.7	12.2	8.8
% with High Cholesterol	11.6	15.6	4.9	14.7
Neighborhood Profile				
% living in a detached house	97.7	93.3	97.4	100.0
% curbside recycling participation	100	100	100	100
% living <3 km from recycling depot	50.0	64.1	61.4	50.0
% using a car for transportation	75.0	73.9	87.5	80.0

Table 2 Means and Standard Deviations of the Behavioural Outcome Variables at Baseline, Four-Weeks, and Eight-Weeks.

	Local Depot			Central Depot		
	Baseline	4 Wk	8 Wk	Baseline	4 Wk	8 Wk
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Affective Message	1.46 (1.96)	2.11 (3.40)	2.13 (4.14)	0.59 (1.10)	1.27 (1.09)	1.55 (1.24)
Instrumental Message	1.54 (2.57)	2.28 (4.81)	0.25 (4.12)	0.65 (1.19)	0.98 (0.98)	1.58 (1.20)
Planning Message	0.99 (1.15)	2.20 (307)	0.89 (4.77)	0.60 (0.94)	1.13 (0.97)	1.31 (1.08)
Control Group	1.07 (0.89)	2.43 (3.03)	1.64 (3.86)	0.62 (0.64)	0.91 (0.51)	1.29 (0.90)

Baseline-4 weeks		
Main Effect P (η^2)	.00 (.07)	.00 (.17)
Time x Group P (η^2)	.77 (.01)	.26 (.02)
Baseline-8 weeks		
Main Effect P (η^2)	.91 (.00)	.00 (.34)
Time x Group P (η^2)	.12 (.03)	.52 (.01)

Flow Diagram