

Incentives in Longitudinal Studies

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Incentives in Longitudinal Surveys

Survey response rates around the world are declining. For longitudinal surveys in particular attrition is a serious concern. The value of longitudinal surveys lies in the opportunity to understand causal relationships and social processes over time, which requires the retention of sample members. These members cannot be replaced, and the loss of members in any wave can lead to greater cumulative losses over time (Lepkowski and Couper 2002). Further, attrition increases the risk of nonresponse bias if nonrespondents are systematically different from respondents.

Incentives are one of many tools used to retain sample members in longitudinal surveys. The use of incentives in the UK have been fairly limited compared to US-based surveys—indeed, most of the cohort studies at CLS have never used incentives, with the exception of Next Steps.

The positive effect of incentives on response rates in both mail and interviewer-mediated surveys is well-established in the literature (e.g., Church 1993, Edwards et al 2002, Singer et al 1999, Singer 2002, Singer and Ye 2013). Though much of this research had been conducted on cross-sectional surveys, a growing literature on the use of incentives in longitudinal surveys addresses issues related to the long-term effects of introducing or withdrawing incentives on response rates, non-response bias and on data quality.

This paper reviews the literature on the effects of incentives in longitudinal studies. With a focus on experimental findings, this paper first discusses how the form, mode of the survey, conditionality and the amount of the incentive affect response rates. Of especial concern to longitudinal studies, the long term consequences on response rates and impact on nonresponse bias are also reviewed. Further, findings on applications of differential incentives for targeting sociodemographic subgroups, converting refusals, encouraging early or web-push responses and saving on potential costs are discussed. Finally, areas in need of future research are presented.

What to give?: Form of incentive

Much of the findings from mail and interviewer-mediated cross-sectional surveys apply in the longitudinal context as well in regards to the form of incentive to give. Any incentive improves response rates over a no-incentive condition, but most of the research establishes that cash incentives increase response rates more than non-monetary gifts, even holding constant the value of the gift (Singer et al 1999, Singer and Ye 2013, Laurie and Lynn 2009). A review of population-based longitudinal cohort studies, however, found that in studies that compared cash or gifts of similar value, it was not clear whether cash was more effective (Booker et al 2011).

To note, most studies using 'cash' incentives have administered the money in many forms, such as cash vouchers, e-vouchers, store vouchers (for one store or a range of stores), debit cards, bank or Paypal deposits, or actual cash. 'Cash' incentives are most often given in the form of gift vouchers that can be redeemed at a range of stores (e.g. Love2Shop) or can access a range of goods (e.g. Amazon voucher).

Other monetary incentives like charity donations and lotteries/prize draws tend to be less effective relative to cash in both cross-sectional and longitudinal surveys (Church 1993, Felderer et al 2017, Henderson et al 2010). Charity donations seem to have a neutral or even negative effect on response rates. Tzamourani (2000) found that the offer of making a

charity donation had no effect on response rates in a face-to-face survey, and in an experiment conducted in a longitudinal online opt-in panel, charity donations of €1-2 per wave performed worse than a zero incentive condition (Göritz and Neumann 2016). Only in one experiment (to our knowledge) has a positive effect been found. Lengacher et al (1995) found that donations offered to a charity as an incentive increased subsequent wave response but this incentive was only offered to those who were already cooperative.

Depending on the mode, lotteries sometimes show improvements on response rates over no incentives. Lotteries appear to be effective in some online surveys (Göritz and Wolff 2007, Bosnjak and Tuten 2003), though mainly found to be ineffective in offline surveys (Dillman 2000). In one experimental comparison of lotteries and gifts in a web survey, neither alone were effective but the two offered in conjunction increased response rates over the zero incentive condition (Bosnjak and Tuten 2003). The relative ineffectiveness of lotteries does not seem to depend on the amount of the potential winning - response rates were found not to differ when sample members were offered different lottery amounts (Porter and Whitcomb 2003, Henderson et al 2010).

The fact that online panels tend to report positive effect of lotteries may be attributable to its survey culture. Lotteries are the most common type of incentive used in online opt-in panels (Göritz 2006), and the frequency of waves may offer more opportunities to 'win' relative to other types of studies. Frequent waves in these panels may also open up possibilities for different kinds of incentives, such as loyalty points that are exchanged for cash. Loyalty points have been used with some success (Göritz 2008), but may not be as effective in traditional longitudinal studies with longer intervals between waves.

An understudied area of research in longitudinal studies is how the effect of types of incentive could vary over time. Evidence from online opt-in panels indicates that the effect of the type of incentive may change over the course of several waves. For example, when a prepaid (non-cash) gift was compared to loyalty points, the response enhancing effect of the gift faded over several waves, but the attractiveness of loyalty points increased with each wave (Göritz 2008).

Incentive effects by mode

Incentives are effective in all survey modes but the effect size of incentives tend to be smaller in interviewer-mediated surveys than in mail surveys (Singer et al 1999, Jäckle and Lynn 2008). In longitudinal interviewer-mediated surveys the person-to-person contact by an interviewer helps to encourage response along with between-wave participant engagement strategies, so they have not had to rely as heavily on incentives as mail surveys. Despite the importance of the interviewer's role in obtaining participation, incentive effects do not seem to vary by interviewer skills (Castiglioni et al 2008) or characteristics (Kibuchi et al 2018), and interviewers do not seem to exert more effort dependent on incentive received (Colicchia et al 2013) though some have reported feeling more confident or motivated (Yemini 2019).

Due to rising costs of fieldwork as well as opportunities provided by internet technology, survey organisations are increasingly using mixed-mode designs that incorporate an online component. Research on incentives in web surveys and surveys using mixed mode designs suggest that the typically lower response rates found in these modes (Lozar et al 2008, Medway and Fulton 2012; Manfreda et al 2008; Patrick 2018) can be ameliorated by the use of incentives (e.g. Bianchi et al 2016).

Positive effects of incentives on response rates and completion rates have been found for web surveys, and reviews suggest that incentives may be more effective in online vs. offline surveys (Göritz 2006; 2010; 2015). For example, a web survey produced higher response rates than paper in a longitudinal survey of young adults when small unconditional and conditional incentives were offered (McMaster et al 2017).

Those studies that have used a web-push sequential mixed-mode design are of particular interest here. Web push methodology (where a web option is offered first) is increasing (Dillman 2017) as substantial savings may be gained in fieldwork costs by not requiring an interviewer visit. Incentives enclosed with Web-push requests may increase response rates (Messer and Dillman 2011; Wood and Kunz 2014). Recent evidence from an Innovation Panel (UKHLS) experiment that offered a web option suggest that incentives could counter-balance the negative effect on response rates of a mixed-mode design. Offering higher incentive amounts to mixed-mode allocated members, either by adding conditional incentives on top of unconditional incentives or by increasing the amount of the unconditional incentive, increased response rates to those found in face-to-face designs (Jäckle et al 2015, Bianchi et al 2016, Gaia 2017). And discussed later in this paper, 'early bird' or time-limited incentives used to encourage web-first responses in mixed mode studies may also be effective in increasing response rates (Peycheva et al 2019).

In the realm of web surveys, there is rapidly increasing interest in the impact of incentives on response rates per device used to respond or on different kinds of mobile responses, such as downloading an app. Response rates are particularly low when respondents are asked to respond to online surveys via smartphone versus a PC (Toepoel and Funke 2018), but the available evidence suggests that incentives are effective in encouraging mobile response. Mavletova and Couper (2016) found that offering twice the usual incentive for mobile questionnaire completion (vs. completion by PC) increased the proportion of mobile users by 20%. Ten Euro incentives also increased response rates of downloading an app and/or keeping the app downloaded by an odds of 10 (and 25 when asked to do both) (Keusch et al, in press).

When to give it?: Prepaid (unconditional) or Promised (conditional)

Though previous literature has found that prepaid (or unconditional) incentives are more effective than promised (conditional) (Church 1993), the difference between unconditional and conditional incentives are not as clear in interviewer-mediated surveys. In a meta-analysis of 39 experiments, Singer and colleagues (1999) found that in studies where prepaid and promised incentives were directly compared, prepaid incentives yielded higher response rates; however, in the overall meta-analysis, they found no statistically significant differences between prepaid and promised incentives.

Any advantage of unconditional incentives may have over conditional incentives are further muddled when assessed in panel surveys. Several studies have found no difference between prepaid and promised incentives on response rates. McGonagle and colleagues (2009) found no difference in the effect of prepaid or postpaid incentive on the rate of return of address update cards, and overall response rates were the same between those who received a promised incentive and those who received both a prepaid incentive and a promised incentive in a longitudinal web survey (Coopersmith et al 2016). In longitudinal studies of young adults, Castiglioni et al (2008) and Collins et al (2000) found that conditional incentives more effectively increased response rates when compared to unconditional, but Jäckle and Lynn (2008) found that unconditional incentives had higher

response rates (but also had higher item nonresponse) than conditional incentives. In an experiment in BHPS, unconditional incentives were found to yield higher response rates to a request for contact updates, but the authors conclude that the conditional incentive was more cost effective (Fumagalli 2010). And in a SHARE experiment using a German refreshment sample, offering prepaid incentives of any amount increased initial refusals even before the interviewer made contact with the household (Borsch-Supan et al 2013), but it is worth noting that the use of unconditional cash incentives is rare in Germany (Pforr et al 2015).

Some incentive experiments in longitudinal surveys suggest that the amount paid may be more important than whether the incentive is unconditional or conditional (Collins et al 2000, James 1997). In an Understanding Society Innovation panel (IP6) web-push experiment, response rates between a £30 unconditional incentive treatment and a £10 unconditional+£20 conditional incentive treatment only differed by 2% (78% and 76%, respectively) by the end of fieldwork. Further, those who received the latter treatment responded more quickly (Wood and Kunz 2014). The inconsistent evidence about the relative effectiveness of unconditional and conditional incentives may be attributable to the role of trust—in panel surveys, promised incentives from a known and trusted survey organisation may appear as certain as prepaid ones.

How much to give?

Research in longitudinal studies (like that in cross-sectional surveys) have generally found a positive association between incentive amount and response rate (Borsch-Supan et al 2013, Booker et al 2011, Laurie 2007, Martin et al 2001, Rodgers 2011, James 1997, Mack et al 1998, Westra et al 2015, Pendleton et al 2019). Offering a 'maximum' amount, however, is not necessarily the best course of action (or financially feasible). Dillman et al (2014) cautions that the amount of the incentive should not be too high, lest it create suspicion. But at the same time, the incentive should be large enough to reduce attrition over multiple waves, as smaller incentives (\$10 compared to \$20) have been found to be ineffective over the long term (Mack et al 1998).

The evaluation of cost effectiveness is important, then, as incentive size should be optimised relative to the potential increase in response rates. A number of studies have found that the marginal increase in response rate was not worth the increase in cost (Fumagalli et al 2010, McGonagle et al 2013, McGonagle et al 2011).

In some longitudinal studies, higher amounts did not uniformly yield the highest response rates. Some incentive experiments have found that lesser amounts yielded higher response rates. Creighton and colleagues (2007) found that a \$20 incentive was more effective than a \$40 incentive or no incentive for those in the poverty stratum, and in the UK, smaller incentives (£5) used in the Labour Force Survey yielded better response rates in high-ethnic minority areas than larger incentives (£10) (Pendleton et al 2019). Even when higher value amounts were tested in a large-scale rotating panel survey (NSFG), the larger incentive (\$60) did not produce higher response rates than the smaller incentive (\$40) (Wagner et al 2017). Moreover, higher amounts may interact by subgroup, whether the incentive is conditional/unconditional and type of response requested. For example, Fumagalli et al (2010) found that higher amounts yielded higher response rates only for those offered conditional incentives for address confirmation card returns, but a lower monetary incentive yielded the highest response rates for change of address cards. Another longitudinal study found that an increase in prepaid incentive was not as effective as an increase in promised incentive for converting refusals among hard-to-reach young adults (Marek et al 2017).

What constitutes a 'large' or 'small' incentive needs to be contextualised, however. Incentives are becoming more widespread in the UK, but tend to be much lower value than those offered in the US (Laurie and Lynn 2009). Whereas US studies may compare the effect difference of \$20 increases or more (e.g. Zagorsky and Rhoton 2008 evaluated the effect of \$0, \$20, and \$40 incentive conditions in the Mature Women longitudinal survey), UK studies like the BHPS or UKHLS (e.g., Laurie 2007, Brown and Calderwood 2014) have found that much smaller increases (£3-5) can have a similar positive effect on response rates. The effect of the size of the incentive can vary within countries as well. An incentive experiment used in SIPP (Survey of Income Participation) in the US found that larger incentives (\$0, \$20, or \$40) had little impact on overall response rates, but had differential effects by region (Westra et al 2015).

Another consideration in determining the amount of the incentive is the burden of a survey. Evidence indicates that incentives are more effective in increasing response rates when there is greater interview burden (Singer et al 1999, Lynn and Sturgis 1997). Longitudinal surveys tend to require more of respondents, such as longer, more detailed interviews, additional paper and/or online components, cognitive tests, biomeasures, and/or requests for data linkage. However, whether survey length or perception of burden is related to response at the next wave is unclear (Hill and Willis 2001), and incentives have not been found to differentially affect those who expressed burden concerns than those who had not (Martin et al 2001). Nevertheless, evidence suggests that incentives can help minimise the potential negative effects of a burdensome wave (Castiglioni et al 2008), and the amount given should be considered in proportion to the burden of the survey.

What could happen?

Long-term consequences on response rates

A major concern about the use of incentives in longitudinal studies is the effect the incentive may have over the long-term. Specifically, will there be an expectation effect where respondents will continue to expect incentives and be discouraged from responding if none or a lesser amount is given? Or if incentives are given to late responders or refusers, will it condition members to delay or refuse in order to receive an incentive? Potential respondents can be discouraged from responding both within a wave, thus affecting cumulative nonresponse rates since prior participation is a strong predictor of future participation, and/or from sweep-to-sweep where the receipt or lack of receipt of incentives in one sweep affects participation in later sweeps.

The literature so far is reassuring. Many find that the effect is neutral in a variety of survey modes (e.g. Coopersmith et al 2014, LeClere et al 2012). The withdrawal of an incentive opportunity does not appear to affect response rates within a sweep. That is, offering time-limited incentives has not been found to negatively affect response rates after the time period expires (Fomby et al 2016, Brown and Calderwood 2014, Peycheva et al 2019), which assuage concerns that sample members would be discouraged from responding if they 'lost out' on an opportunity for a higher incentive.

Also, receiving incentives does not seem to create an expectation or conditioning effect in later waves. Lynn et al (1997) found that incentive effects on response rates may be largely independent between waves with little or no carryover effect – those who received an unconditional £5 incentive did not differ in response rates from those who did not receive the incentive at the next wave. And those who had received a large 'end game' incentive did not have different response rates in later waves from other initial refusers who had not received

an incentive (Lengacher et al 1995), nor do such refusal conversion incentives seem to condition respondents to delay responses in later waves (Colicchia et al 2012).

Even more assuring, many studies find that the positive effect on response rates endures over later waves, thereby reducing cumulative nonresponse. A positive effect of an incentive in a panel seems to persist even without repeated incentive payments (Laurie and Lynn 2009, Mack et al 1998, Scherpenzeel et al 2002, Castiglioni et al 2008, Sundukchi 1999). Jäckle and Lynn (2007)'s incentive experiment on a postal/telephone longitudinal survey among young adults (YCS) found a lasting but diminishing effect in later waves and found that effects of incentives at later waves were independent of incentives at earlier waves. And in US Census Bureau surveys (SIPP and SPD), higher incentives given in the first wave had lasting effects on reducing nonresponse.

Consequences on nonresponse bias

As response rates are not necessarily a good indicator of survey quality, it's important that nonresponse bias should be taken into account (Singer and Ye 2013, Groves 2006). Nonresponse bias can result from differential effects on sample composition or from affecting the quality of the data (e.g., item nonresponse). There have been mixed results on the impact of incentives on nonresponse bias.

Research in cross-sectional surveys have found no differences in data quality or differential measurement errors where respondents were offered either a cash incentive or a gift (e.g., Ryu et al 2006), and no effect on item nonresponse or effort expended during the interview (Singer et al 2000, Medway and Tourangeau 2015). There have been similar findings in longitudinal surveys of a neutral effect on nonresponse bias (Westra et al 2015, Cantor et al 2008, Borsch-Supan et al 2013, Yu et al 2017, Husseman et al 2016). Jäckle and Lynn (2008) found that incentives increased item non-response but the positive effect on response rates outweighed this negative effect, and incentives largely had proportionate effects on response rates across respondent characteristics. Changing the incentive from conditional to unconditional had no effect on response rates on item nonresponse either.

Other studies have found that incentives reduce nonresponse bias over waves (Bruderl et al 2008, Goldenberg et al 2009). In a report of the use of incentives in longitudinal US Census Bureau surveys (SIPP and SPD), Creighton and colleagues (2007) found that incentives reduced item nonresponse, and Laurie and Lynn (2009) conclude that incentives used in longitudinal surveys can reduce bias by disproportionately increasing response for those with low response propensities. In McGonagle and Freedman's (2016) incentive experiment in a PSID supplement, the incentive did not introduce or exacerbate sample bias, and may have even slightly reduced a pre-existing bias by bringing in a disproportionate number of less educated people.

Findings on the differential effects of incentives do suggest that there is a potential to reduce sample bias by bringing in those sociodemographic groups with low response propensities. Several studies in both longitudinal and cross-sectional surveys have found differential responsiveness to incentives by sociodemographic status, namely that incentives have a stronger effect on low income, low education, and ethnic minority respondents (e.g., Felderer et al 2017, McGonagle and Freedman 2016, McGonagle et al 2013, Laurie 2007, Mack et al 1998, Martin et al 2001, Ryu et al 2006, Wagner et al 2017). In the UK's Department of Education-sponsored Omnibus Survey of Pupils and their Parents/carers, incentives doubled response rates for all groups, but tripled response rates for Free School Meal eligible members (Knibbs et al 2018). Stronger effects of incentives on older sample members have also been found (Lynn 2012, McGonagle and Freedman 2016) as well as young adults

(Laurie 2007), both of which are groups that tend to have lower response rates (Bhamra et al 2008, Laurie 2007).

Some longitudinal studies, however, have found that incentives do not have differential effects based on demographic factors. Husseman et al (2016) found that incentives increased consent rates of parents agreeing to let their children be interviewed and helped secure participation of those who had previously refused, but had no differential effect according to various demographic factors. And in a longitudinal health study of ethnic minorities in the US, early bird incentives increased response rates over all population subgroups and were not affected by household characteristics (LeClere et al 2012). In a rotating panel survey (SCA), incentives increased response without affecting nonresponse bias based on sociodemographic characteristics (Suzer-Gurtekin et al 2016).

Evidence about the impact of incentives on nonresponse bias in mobile web surveys is limited, but initial indicators show that there may be some impact on sample composition. Incentives offered to encourage mobile web completion affected the sample composition, with higher participation rates among females and those with higher levels of education (Mavletova and Couper 2016).

To whom should they be given?: Differential Incentives

The finding that there may be differential response propensities to incentives may present a case for the use of differential incentives. Differential incentives can be divided into two broad types: those that are targeted based on respondent sociodemographic characteristics and those that are contingent based on respondent behaviour, either in the past or present. As discussed above, given that incentives may have a stronger effect on those with low response propensities, it may be cost-effective to offer incentives to particular subgroups based on sociodemographic characteristics like income in order to boost response rates for these groups and help reduce nonresponse bias. One of the key advantages of longitudinal studies is the wealth of information on sample members that would enable a targeted design (Lynn 2015; 2017).

Incentives have also been used effectively to target those based on behaviour- namely, nonresponse. Evidence suggests that incentives are especially effective at converting refusals and have little effect on noncontact rates (Singer et al 2000, McGonagle and Freedman 2016). Incentives have been found to be effective when previous refusers were offered an incentive to take part at a later wave (Martin et al 2001, Rodgers 2011), both for recent and long ago refusals (Creighton et al 2011). Longitudinal studies also offer an opportunity to target those with low response propensities based on a number of factors and behaviours. In a PSID experiment, time-delimited incentives were found to be both a cost efficient and effective strategy for capturing those with the highest initial probabilities of nonresponse (Fomby et al 2016). 'End game' incentives, whereby reluctant sample members are offered increasingly higher incentives to secure cooperation have also been found to effective in converting refusals, without affecting participation in later waves (Lengacher et al 1995).

Some studies have evaluated the effect of refusal conversion incentives on data quality and sample composition. In the large-scale longitudinal World Trade Center Health Registry survey, those receiving the refusal conversion incentive achieved a response rate 30% higher than those who did not, and there were no differential effects of the incentive on response completeness or across socio-demographic groups (Yu et al 2017). In a 35-year longitudinal study of women, incentives were given to both previous refusers and previous participants, but were most effective among those with low cooperation propensities and

improved their data quality measured by length of interview and more items answered (Zagorsky and Rhoton 2008).

More recently, incentives have also been used to encourage certain response behaviour, like early response and/or response via web (e.g. Peycheva et al 2019). There have been some inconsistent findings on the effect of early bird incentives on response rates, however. Some studies have found that early bird incentives increased response rates during the time-delimited period, but did not increase response rates overall (Coopersmith et al 2016, Peycheva et al 2019, Ward et al 2014). Others have found that early bird incentives successfully increased overall response rates (DeSantis et al 2016, LeClere et al 2012), particularly by increasing response rates among those who were hard-to-reach or had low response propensities (Goble et al 2014, Fomby et al 2016). Early bird incentives may also decrease respondent burden by reducing subsequent contact attempts which would provide longer rest periods between waves.

One of the main advantages with early bird, push-to-web and differential incentives in general is that it can save costs by encouraging early response, and particularly response via web. These cost savings can come about because incentives are only offered and given to specific sub groups, or these cost savings can be reaped by decreased fieldwork and follow-up costs.

However, there are inconsistent findings on the cost-effectiveness of early bird incentives. Some studies had adopted the early bird approach after experimentation due to the substantial fieldwork savings in follow-up calls and data collection efforts (Coopersmith et al 2016, DeSantis et al 2016, Goble et al 2014). Other studies found the results and cost savings to be more moderate. In the NLSY79, which first introduced the 'early bird' approach, incentives were offered to those who set up an appointment within four weeks. Response rates were slightly higher and took less interviewer time to complete, but the early bird incentive was only offered to the most cooperative respondents (Kochanek et al 2010). An early bird incentive used for the first time in a major UK longitudinal survey (IP of UKHLS) only had modest take up rates, so the overall impact was minimal (Brown and Calderwood 2014). Carpenter et al (2018) found a cost savings of £1.14 for every £1 spent to implement the bonus for completing the interview online.

Where is evidence weak?

Although research on incentive effects in longitudinal studies have burgeoned, there are still several areas that have been neglected:

First, it is yet inconsistent and unclear how 'cost-effectiveness' should be calculated. Research based on longitudinal studies generally finds positive association between incentive amount and data collection efforts like number of calls (James 1997, Rodgers 2011), but the weighing of incentive costs relative to costs of other data collection and fieldwork efforts is not clear, not stated or often presumed rather than calculated.

Second, there is little research on the impact of the administration of incentives (Görizt 2015) in longitudinal surveys. The difference in impact between cash-in-hand and cash-like incentives (e.g., gift vouchers, cash vouchers, debit cards) are relatively unknown. Also unknown is how the type of gift voucher—e.g., e-voucher, Amazon.co.uk voucher, or other store vouchers- might impact response rates. Online opt-in panels, though different in many aspects from traditional longitudinal surveys, have investigated the administration of cash incentives and have found that the mode of how cash incentives are given matter. When comparing monetary incentives administered via bank transfer, PayPal, loyalty points (loyalty points could be cashed in) or charity donations, Görizt and Neumann (2016) found that

PayPal administered incentives lowered baseline responses, and bank transfers increased retention over waves. The use of PayPal is somewhat controversial. It has the advantage of a 'mass payment' option that makes paying a large number of people simultaneously possible. However, retrieving payments requires some technical skill as well as registration with PayPal (or other like intermediary). In a study of the effect of a PayPal-administered incentive, researchers found that the effect changed over the course of a German online opt-in panel. While it lowered response rates in the first wave, it enhanced response thereafter, then remained neutral (Görizt et al 2008). In another study, a \$2 bill was found to have a higher response rate than a \$5 cheque despite the increased value of the \$5. However, the cost of having to cash the cheque may have reduced its value, or the rarity of the \$2 bill may have increased its perceived value (Doody et al 2003).

Third, how time between waves affects the impact of incentives and response propensities of participants is also unknown. Loyalty points may be successful in online panels because respondents are asked to respond to surveys with very short intervals in between each wave (e.g. 1 month).

Fourth, how incentives interact with the maturity of a panel is not well known. Given that incentives tend to be more effective in surveys where the saliency of the research may not be high for respondents (Groves et al 2000), this seems an understudied area of research. Laurie and Lynn (2009) has suggested that panel attrition in previous waves leaves a sample of loyal and interested respondents who may be less responsive to extrinsic incentives, and there is some evidence that response behaviour may be affected by the time sample members have been in the panel (Watson and Wooden 2011, McGonagle et al 2011). For CLS birth cohort studies, this may mean that incentives may not be as effective for older birth cohorts, and may even diminish altruistic motivations for participating. In an incentive experiment in the Health and Retirement Study in the US, enjoyment of the first interview was related to response propensity at the second wave, but among those who received the large incentive, those who enjoyed the interview were less likely to take part. The incentive seemed to cancel out the enjoyment effect (Lengacher et al 1995).

Another area of opportunity for research lies in the application of incentives for different kinds of mobile surveys, a move to which survey methodology is quickly headed. Existing research is in its nascent stages, and it is yet unclear how incentives might differentially affect mobile survey respondents as well as differentially affect types of mobile survey applications, including but not limited to questionnaires, downloading apps, GPS tracking, 'passive' mobile data collection, playing games, or wearables.

In general, we need a better and more nuanced understanding of why people respond or do not respond to surveys. Reasons for attrition can vary by group as well as by individual circumstance. For example, wealth predicts attrition in the US, but not in England, and low education predicts attrition in England, but not the US (Banks et al 2011). Attrition among older people have been found to be correlated to cognitive impairment, being childless, being lower socioeconomic status and being obese (Bhamra et al 2008). Further, Colicchia et al (2012) found that some respondents refused even with increased incentives, and some previously compliant respondents refused even after the highest incentive was offered, suggesting that difficult-to-convert respondents are not the same across waves. Relatedly, the survey tradition or culture of a country can impact responsiveness to incentives as well (Pforr et al 2015, Laurie and Lynn 2009). Better understanding reasons for survey response can help inform the strategic use of incentives on those with low response propensities or those who would be most responsive to incentives.

More broadly, Singer and Ye (2013) urges that theory should guide practice; as survey conditions vary between studies, it is often not possible replicate the exact incentive conditions. Perceptions postulated by theories for why people do or do not respond to incentives have not been adequately explored. Though not discussed in length in this paper, three main theoretical frameworks are most often used to explain why incentives work: Social exchange theory (Gouldner 1960) suggests that a sense of reciprocity encourages response, Leverage salience theory (Groves, Singer and Corning 2000) explains that decisions to respond are based on the subjective salience of different factors, and economic models of survey response or opportunity cost theories postulate that people decide based on the weighing of benefits against costs (Ajzen and Fishbein 1980).

Finally, ethical issues related to the use of incentives and, in particular, differential or targeted incentives need further exploration. The few studies by Singer and colleagues that have examined this issue are encouraging. Larger incentives do not seem to induce people to take higher risks they would not take with smaller incentives (Singer and Couper 2008), and when told about differential incentives, respondents felt it unfair but their feelings did not affect later participation (Singer, Groves and Corning 1999). A NatGen report by Nicholaas and colleagues discussing these issues in detail is forthcoming.

Conclusion

Incentive use, type, amount, mode, conditionality, frequency and targets all need to be considered in light of a number of scientific, practical, cultural, ethical and financial factors. Several lessons can be drawn from the literature that can inform decisions about incentives in longitudinal studies:

- Cash incentives (or cash-like, in the form of vouchers) are more effective than gifts, lotteries, charity donations, or loyalty points. However, the increasing use of online or mobile web designs may offer opportunities for the use of different types of incentives, and impact the effectiveness of 'cash'.
- Incentives increase response rates in all modes, but are especially effective at increasing response rates for survey modes that typically yield lower response rates, like online or mobile web surveys.
- Although it has been generally accepted that unconditional incentives are more effective than conditional incentives in boosting response rates, incentive experiments in longitudinal surveys do not always find this to be the case.
- Larger amounts are associated with higher response rates, but are not always cost-effective.
- Incentives seem to have an enduring, positive effect on response rates in later sweeps.
- Incentives do not appear to increase nonresponse bias through sample composition or data quality. They may have the potential to ameliorate existing sample composition bias, particularly when used in a targeted way for groups with lower response propensities.
- Time-limited incentives may not be effective at increasing overall response rates, but do increase response rates within the time period allotted.
- Further research is needed on the evaluation of cost-effectiveness, the administration of monetary incentives, the impact of time (time intervals between sweeps and panel maturity), incentive use for mobile web applications, and why people choose or choose not to respond to surveys.

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