American Time Use Survey Web Data Collection

Final Report

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Prepared for:
Bureau of Labor Statistics
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Prepared by:
Westat
An Employee-Owned Research Corporation®
1600 Research Boulevard
Rockville, Maryland 20850-3129
(301) 251-1500

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General Introduction

This report presents research conducted by Westat about the feasibility of moving the American Time Use Survey (ATUS) from telephone data collection to a mixed-mode design involving both web and telephone modes. A move to a mixed-mode design has the potential to help ATUS improve response and be prepared for the survey climate of the future.

This web design task focuses on the diary and follow-up summary questions (work, volunteer, secondary childcare, and eldercare) and consists of three main components. First, the literature review in Part I reviews the literature on web and mixed-mode data collection to help inform any potential issues of introducing web data collection in ATUS. The literature review discusses findings from the literature on coverage, response and measurement of web data collection instruments. We also review several time use surveys that have considered or are using web data collection.

Next, the web design task in Part II provides recommendations on the design of web data collection for the ATUS. The web design task considers allocation of respondents to mode in a mixed-mode design, contact procedures, and question design considerations for a web instrument.

Part III includes a discussion of comparability issues between web and telephone data collection. This section of the report covers methods to evaluate the proposed design including errors of nonobservation (e.g. coverage and nonresponse error) and errors of observation (e.g. measurement error). We also discuss additional experimental factors to consider, adjustments for mode effects, and recommendations for evaluating elements of the web diary design.

Finally, Part IV synthesizes the material in the report and briefly describes a preliminary mock-up of the recommended diary design.

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Part I
Literature Review

Introduction 1

The goal of this literature review is to provide background to the Bureau of Labor Statistics (BLS) about the use of web instruments to collect time use information. This will help to inform BLS about whether the American Time Use Survey (ATUS) should move from CATI to a mixed-mode design including both self-administered web and CATI. Other important goals are to improve response and to be prepared for the survey climate of the future. Any movement from CATI to a different mode could also introduce comparability issues with the ATUS historic data set, which at present comprises 11 years of data. Hence this review will also investigate what the existing literature on mode differences suggests on this topic. Importantly, the results of this literature review will help inform the web design task that is to follow.

The literature review includes research from the more general mode literature involving web data collection and where possible we include examples of web surveys used to collect time use diaries. We begin with a brief review of the ATUS design and processes that are relevant for moving to mixed-mode data collection. Next, we discuss response and coverage issues for web surveys. Third, we discuss measurement issues for time diary surveys and the implications for mixed-mode data collection. Then we detail some specific time use diary studies found in the literature search. Finally, we end with some general conclusions from the literature review about the web design task.

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The American Time Use Survey ▮2▮

ATUS is a unique source of information about the amount of time that Americans spend on a diverse range of activities, including nonmarket activities like housework. The sample is drawn from households that have completed their final round of the Current Population Survey (CPS). Hence, the ATUS is a rich frame design that includes much information about the respondent that could be used to contact the respondent using different modes of data collection. A designated person (DP) from the CPS panel, age 15 and older, is selected and assigned a specific day of the week to report for. Ideally, any mode that is used to collect time use information should be able to encourage respondents to complete the diary on the designated day. The respondent reports for a 24-hour time diary about "yesterday." The interview is conducted using CATI. There are 17 major activities in the ATUS lexicon. A diary requires at least five activities to be included in the published figures. The median number of activities per diary is about 20-21. Data are published annually.

The ATUS interview consists of several parts: (1) information about household composition, (2) the respondent's labor force and school enrollment status, (3) the 24-hour time diary about "yesterday," and (4) summary questions about specific topics of interest. "Yesterday" is defined as 4 a.m. the previous day to 4 a.m. on the day of the interview. All activities undertaken during the time period are reported on. The smallest reporting period is 1 minute. Respondents can report the duration of the activity or the start and stop times. The ATUS interview lasts approximately 15 minutes; there are sometimes optional modular questions that usually run approximately 5 minutes. Modules are funded by other agencies and relate to time use.

The ATUS interviewers have a number of follow-up probes that they use to gather more information on specific topics and responses in the diary. One type of follow-up probe is automated; with this probe, a pop-up screen in the CATI instrument displays the probe question text. Any activity that lasts more than 2 hours, with the exception of sleeping, working, or attending high school, requires the interviewer to verify the activity by asking the question: Did you stop (activity) to do anything else at that time? Work activities that last more than 4 hours generate an instrument pop-up requiring the interviewer to ask the respondent if he/she took any breaks of 15 minutes or longer. If a respondent reports sleeping more than 10 hours, the interviewer must verify the duration of the sleep activity. Another automated probe is for respondents who do not report any eating or drinking activity in the diary. Interviewers must verify that the respondent did not eat

or drink on the diary day. There are a number of other probes that do not automatically pop up but which interviewers must still ask about certain activities to collect the level of detail required for activity coding. The interviewer is instructed to record the main activity only. If a respondent reports simultaneous activities, the interviewer asks questions to see if the respondent can separate the activities, if possible; if not, the interviewer asks the respondent to identify which activity was the main activity.

A number of summary questions are asked after the time diary to collect information on specific topics of interest. This includes secondary child care, or care for children under age 13 that is done while doing an activity other than primary child care; activities done for pay; volunteer activities; and eldercare. Eldercare is defined as care provided in response to a "condition related to aging."

The inclusion of these different types of questions in the ATUS raises important design considerations for any mode change. The comparability of the new mode with CATI data collection is important since the ATUS has been using this single mode for more than 10 years. For example, the follow-up probes help to ensure that appropriately detailed information is collected in the ATUS and that data quality is sufficient. It is important to understand if any new mode of data collection is able to replicate this capability to reduce mode differences in the resulting data.

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Internet Coverage and Response to Web Surveys | 3

These next two sections explore error properties of web surveys to provide an understanding of the implications for total survey error when moving to web data collection. We focus this review on the most relevant error sources for the ATUS: coverage, nonresponse, and measurement. We exclude a discussion of sampling error since the ATUS has an existing sampling frame consisting of outgoing participants of the CPS. We begin with a discussion of coverage and response.

Internet Coverage

One important consideration in migrating to a mixed-mode design involving web surveys is the extent to which the U.S. population is covered by Internet access. Surveys disagree on the exact percentage of households with Internet access; however, the number of households that have access to the Internet has clearly been growing over the past several years. Tourangeau, Conrad, and Couper (2013) summarized estimates of coverage from several different surveys. They show that, according to the CPS, between 1997 and 2009, Internet coverage among U.S. households has grown from 18 percent to 69 percent. A Pew survey in 2011 suggested that coverage may be as high as 78 percent. As Tourangeau, Conrad, and Couper indicate, obtaining an exact percentage of households with access is difficult since individuals may be able to obtain access in multiple locations including home, work, school, or other public places such as the library. In addition, the advent of mobile devices such as smartphones and tablets is also probably improving coverage.

In addition to the overall level of coverage, it is also important to understand whether this coverage differs across demographic groups. Tourangeau, Conrad, and Couper (2013) present evidence from the Health Information National Trends Survey (HINTS) conducted in 2005 and 2007 that indeed there are differences. The most glaring differences occur with age, education, and race. As one might expect, Internet coverage declines with age. HINTS 2007 shows that 80 percent between the ages of 18 and 34 are covered, whereas only about 45 percent of those 65-74 are covered. In addition, approximately 80 percent of those with some college are covered, but only about 56 percent of those with a high school diploma are covered. Finally, 75 percent of non-Hispanic whites are covered, but only about 56 percent of non-Hispanic blacks, and 49 percent of Hispanics are covered. It remains to be seen how quickly these differences will disappear as coverage of the entire

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population increases. These differences do suggest that different demographic groups are likely to respond quite differently to the introduction of a web option in a mixed-mode design for the ATUS.

Overall Response to Web Surveys

In order to understand how people respond to web surveys we first consider response to stand-alone web surveys and how the level of response compares to other modes. Meta-analytic studies that have compared response rates from web surveys to other survey modes have found that web surveys achieve lower response rates than the other modes. Two studies have found that on average the response rate for web surveys is approximately 11 percent lower than other modes of data collection (Lozar Manfreda et al., 2008; Shih and Fan, 2008). Most of these studies have compared web surveys to mail surveys. Relatively little is known about how response rates for web surveys compared specifically with telephone surveys. A meta-analysis by Lozar Manfreda (2008) included only five telephone studies, but found that response rates for web surveys are about 12 percentage points lower than their telephone counterparts. A similar difference was found between mail and web.

There is also evidence that break-offs are greater for web surveys than for CATI surveys. CATI surveys have the advantage that the interviewer can call the respondent back and complete the interview, thus having an interruption as opposed to a termination (McGonagle 2013). Peytchev (2009) identifies the following characteristics of the questionnaire that lead to higher break-offs in web surveys: (1) questions that are longer and more complex, that is, more burdensome for the respondent, have higher break-off rates. (2) Open-ended questions lead to higher break-off rates. (3) The presence of a progress indicator that makes the survey appear long can also contribute to a higher break-off rate.

Factors Affecting Participation

The available evidence suggests that many of the same strategies for obtaining participation in traditional survey modes such as mail, phone, or in-person may also apply to web surveys. A few studies suggest that prenotification is effective for web surveys (Crawford et al., 2004; Harmon, Westin, and Levin, 2005). Mailed advance letters have been found to be more effective than advance e-mails. In terms of the actual invitation to complete the survey, there are some reasons to believe that e-mail invitations might be better. One would expect that the ability to include a link in the e-

mail to go directly to the survey would provide an advantage; however, this ease of access has to be weighed against the likelihood that the sample person will actually open the e-mail. Tourangeau, Conrad, and Couper (2013) discuss how the prevalence of spam and the volume of e-mail create an environment where the typical survey request may not even be noticed. In addition, even slight errors in e-mail addresses will cause the invitation to be returned, which places a high value on having correct information on the sampling frame. In contrast, there is more tolerance for error with postal mail addresses. That being said, it is likely that the preference for e-mail or postal invitations may vary by population. Kaplowitz et al. (2012) found that a postcard invitation was better for faculty and staff, but not students from a university. There are some design choices that may improve response in e-mail invitations. For example, personalization of the e-mail tends to increase response, especially when the sender of the e-mail has high status (Heerwegh et al., 2005; Joinson and Reips, 2007; Joinson, Woodley, and Reips, 2007).

The number of contacts with the respondent also influences response. Increases in the number of contact attempts may be particularly intriguing by web since each additional contact attempt incurs no monetary cost. Meta-analyses have shown that there are larger differences between modes when more contact attempts are made (Lozar Manfreda et al, 2008; Shih and Fan, 2008). That is, although each additional contact attempt on the web may recruit more respondents, there seems to be a larger diminishing effect relative to other modes. Tourangeau, Conrad, and Couper (2013) suggest that continued reminders by e-mail may harden respondents to the request. Furthermore, these reminders may also be less likely to be read than they are in other modes.

Incentives are another common method for attempting to improve response. There are two approaches to incentives in the broader survey methodological literature that have the most success. Prepaid incentives achieve higher response than promised incentives, and offering cash achieves higher response than all other forms of incentives (Singer, 2002). In spite of these findings, the web survey literature on incentives is replete with examples of lottery incentives conditional on completion of the survey (Goritz, 2006). This also appears to be true in time diary surveys involving web data collection (Bonke and Fallesen, 2010; Wu et al., 2012; see also Table 2 this document). Bonke and Fallesen (2010) present model-based evidence that a combination of lottery incentives improved response in a mixed-mode survey involving a time diary. Goritz (2006) presents evidence that lotteries are helpful for improving response in commercial panels, but there is scant research showing that these types of incentives are effective in other settings. The notion of a lottery incentive with capped costs is appealing for containing the cost of a survey. In addition, it is often difficult to deliver prepaid cash incentives in the context of a web survey. There are examples of efforts to mimic this transaction with electronic means such as PayPal that have been unsuccessful

(e.g. Bosnjak and Tuten, 2002). It is important to note that the ATUS may not have as many limitations as most web surveys do because of its rich sampling frame. For example, prepaid incentives could be mailed to households in an advance letter to the sample person.

Mixed-Mode Considerations

Due to the lower coverage and response to web surveys compared to other modes, it is understandable that using the web alone may not be the best approach. Therefore, it may be better to use the web in combination with other modes of data collection. Mixed-mode data collection aims to improve overall response and to shift as many respondents as possible to the web, because it is a cheaper mode and each additional respondent does not add much cost to data collection (unless a cash incentive is involved).

There are different strategies that can be undertaken to increase the number of respondents who complete the survey via web. One approach is a concurrent mixed-mode design where the respondent is simultaneously offered the option of completing the interview using one of two or more modes. There is a gathering consensus in the literature that offering multiple modes simultaneously may actually hinder response. The exact reason for this lower response is unknown at this time. One explanation is that offering a choice adds complexity and burden to the survey request by requiring respondents to weigh the pros and cons of each mode, with the result that some respondents opt not to participate at all (Medway and Fulton, 2012). Offering a choice also provides the opportunity for respondents to procrastinate about the decision long enough that they lose the materials needed to participate (Tourangeau, Conrad, and Couper, 2013). Another possibility is the incompatibility of two modes. For example, respondents may be contacted in one mode, but prefer to complete the survey in another mode; this increases the time and effort needed to participate and they decide not to respond (Tourangeau, Conrad, and Couper, 2013). Finally, it is possible that some respondents may actually start completing the survey in a mode such as web and then encounter implementation failure or technical problems. As a consequence the respondent may have lost the materials required for the other mode (e.g., mail) or may decide to drop the effort to participate all together as consequence of the problems encountered (Tourangeau, Conrad, and Couper, 2013; Medway and Fulton, 2012).

Another approach to mixed-mode design is the sequential mixed-mode design. In a sequential mixed-mode design all respondents are given the opportunity to complete the survey in a single mode initially, typically an inexpensive mode, but are followed up in another mode. Bonke and

Fallesen (2010) present an example of sequential mixed-mode design in the context of time diary research. They sent sample persons a letter offering the choice of a 10-15 minute telephone interview or a web survey with an access code. The respondents were called and asked to complete the survey over the telephone if the web questionnaire had not been received within two weeks. They achieved a similar level of response to a previous paper time use survey of the Danish population in 2001. The design led to about one fifth of the respondents completing the time diary over the web.

The sequencing of modes to improve response and reduce costs is an active area of research that is currently unsettled. A study by Millar and Dillman (2011) presents evidence that sequential strategies that push the web mode more strongly in earlier contacts can achieve similar response rates and lead to a higher proportion of respondents completing the survey over the web compared to designs that stress other modes (e.g., mail) early and web later. Others have failed to replicate these findings. In addition, Cantor et al. (2010) conducted a mode experiment in a 2-phase survey. An ABS sample was sent a paper screener to identify Veterans and their families. The Veterans and their families identified in phase 1 were given a choice of responding to the phase 2 questionnaire via mail or web. The authors found that the response rate for the mail-only design was higher than the sequential mixed-mode design. Hence, there is still much research that needs to be conducted to determine the optimal sequencing of modes.

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Measurement of Time Use 4

Introducing another mode of data collection can introduce differences in data that may be due to differences in the measurement properties of the available modes. There are two sources for measurement differences between modes when measuring time use. First, the survey methodological literature has identified various characteristics of modes that influence measurement error. This literature suggests that characteristics of the mode such as the presence of the interviewer, computerization, and the channels of communication that are utilized may influence the measurement properties of a survey mode. Second, there are survey design decisions that are made in the context of time use diaries that may have implications for mode differences if the decision leads to a preference for one or the other modes. These decisions include whether the activities are recorded verbatim or in precoded categories, whether the time period is fixed or variable, whether secondary activities are recorded, whether contextual questions are asked, differences in recall periods, whether probes or follow-up questions are needed, and the number of diary days that are measured (Gershuny, 2011).

General Mode Differences between Web and Telephone

There are some important differences between web and telephone surveys that may lead to differences in the data that are collected. One key difference is the presence of the interviewer. An interviewer can have both negative and positive influences. On the positive side, the interviewer can be helpful for recruiting respondents to participate. The interviewer also can be trained to identify problems and to probe appropriately. This is particularly true in the ATUS where flexible interviewing is used to aid recall in the time diary (BLS, 2013). The introduction of web raises the question of whether recall can be improved in other ways with web data collection. For example, it may be possible that web data collection allows the respondent to spend more time on the instrument, which aids recall. The influence of web on recall also depends on the timing of diary completion. It is possible that the web diaries could be completed sooner than is possible for a telephone interview such that recall is improved. On the negative side an interviewer creates more social presence, which leads to less reporting of socially undesirable behavior and more reporting of socially desirable behavior (Tourangeau and Yan, 2007). The introduction of a web data collection

has the potential to improve reporting of socially desirable or undesirable behaviors relative to CATI, which may lead to differences in data quality between the two modes.

Computerization is another difference that might lead to differences between modes, because the approach to computerization affects the complexity of the survey instrument. The current ATUS instrument includes some complicated features such as controlling the overall flow of the instrument and probes that are used to ensure data quality (e.g., when the respondent makes a potential error such as when an activity takes longer than two hours or forgets to enter a travel activity). Existing time use diaries completed over the web can control question flow and have shown that probes can be programmed to check for data quality (Houle, 2014; Wu et al., 2012).

Web introduces a visual channel of communication to the ATUS, whereas the current instrument is completely auditory. This may be the source of the biggest difference between the existing CATI instrument and any potential web instrument. The visual display of information in web data collection creates many possibilities and potential challenges. Since the respondent is now interacting directly with the instrument, the time diary will have to be designed in a way that the respondent can complete the interview with little or no assistance. Tourangeau, Couper, and Conrad (2013) review a vast literature on visual design of web surveys that would be impossible to review thoroughly in this literature review. The design of a web instrument will have to consider the specific layout of information on the screen and its comparability with the ATUS CATI data. Much of the visual layout will be driven by the specific decisions about measuring time use so we will mention visual design implications during the following discussion. The most effective way to evaluate the effect of the visual layout is through rigorous usability testing.

It is also noteworthy that another feature of the web that could be beneficial to ATUS is interactivity. Tourangeau, Conrad, and Couper (2013) discuss a number of interactive features of the web and guidelines for using these features. Some of these features can introduce bias and require a great deal of caution. For example, images can have unintended impact on the answers (Couper, Tourangeau, and Kenyon, 2004). There are at least two features that may be of assistance to ATUS. First, the instrument can be made more interactive by including such features as showing respondents a summary of their time use activity as it is reported or at the end of the interview so that respondents can review what they have reported. The Modular Online Time Use Survey (MOTUS) demo allows for this capability. Another feature is the introduction of video to describe to respondents how they can complete the diary and also provide them with background on the purpose and uses of the ATUS. Some of the web and mobile applications that we reviewed utilized this type of interactivity (Minnen et al., 2014; Sonck and Fernee, 2013).

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Aspects of Time Use Measurement that May Affect Mode Differences

Next, we briefly review a few key issues that may influence potential differences with the existing CATI instrument. We base this discussion on a number of sources that discuss some of the critical design decisions related to time use measurement (e.g. Gershuny, 2011; United Nations, 2013). The topics we will discuss are shown in Table 1.

Table 1. Design considerations for web design

Design choice	Examples	Current ATUS design
Recording of activities	Verbatim/Precoded	Verbatim (coded by interviewer)
Time period	Fixed/Variable	Variable
Number of activities	Primary/Secondary	Primary (except childcare)
Additional questions	Who were you with? What was your location?	Who was in the room with you? Who accompanied you? Who was with you? (The WHO question varies depending on the activity reported.) Where were you while you were [ACTIVITY]?
Probing	Missing travel time, missing sleep time, missing eating and drinking	Multiple probes included
Reporting period	Yesterday/Tomorrow	Yesterday
Diary days	1 – 7 days	1 designated day

One design issue that will affect both the design of a web instrument and may be a cause of mode differences is how the activities are recorded in the diary. The time use literature refers to "full diaries" where the respondent's activities are recorded more or less verbatim and "light diaries" where respondents would record their activity using a precoded list. Full diaries also often collect more information, but the key difference seems to be the entry of the actual activity. A light diary approach may reduce burden, but may not measure time use as accurately as a full diary. The current ATUS is a full diary that begins with the interviewer asking, "Yesterday at 4:00 AM, what were you doing?/what did you do next?" so that respondents can verbalize in their own words what they were doing. The interviewer enters the activity information. The ATUS CATI instrument includes precodes for a few straightforward activities; on the other hand, most activities are entered verbatim and coded in a separate coding step. The ATUS lexicon includes 17 major activity classifications and more than 400 detailed activity classifications.

There are examples of paper self-administered diaries taking both "full" and "light" approaches. For example, New Zealand uses a full approach by having respondents enter the activity in their own

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words on each line of the diary. Japan and Finland have tried both full and light approaches (see Appendix A for examples). The Finnish experience is that light diaries produce less time in activities, such as housework (Paakkonen and Vaisanen, 2012). The web diary instruments that we reviewed all used some kind of precoded category scheme that varied in complexity. In addition, there are different ways to display and have the respondent select the codes. Drop-down boxes and radio buttons were used to select activities depending on the complexity of the list. Some diaries such as the MOTUS demo version allows for drop-down selection or keyword search. The Dutch Time Use Survey (DTUS) smartphone pilot allowed for open-ended entry if the respondent's activity did not fit one of the existing categories (Sonck and Fernee, 2013).

Another important design decision is whether the time period in which information is entered is fixed or variable. For example, activities can be entered in 10 or 15 minute intervals or the respondent can simply be asked how long an activity lasted or report the beginning and end time of the activity. The current ATUS asks "How long did you spend [ACTIVITY]?" so it is a variable time period. The New Zealand paper time diary presents fixed time periods of five minutes (see Appendix A) and the DTUS smartphone pilot presents fixed ten-minute intervals. Intuitively, variable time periods probably represent the most accurate measure of reported time use since respondents can say exactly how long they participated in an activity. There are examples of web diaries that utilize variable time periods like the ATUS including the MOTUS demo and Canadian web pilot diary (see Appendix B).

Diaries can also differ in the extent to which they allow respondents to enter simultaneous activities. For example, some diaries allow the respondent to only enter primary activities, whereas others allow respondents to enter primary and secondary activities. For the most part, the current ATUS only allows the respondent to enter primary activities. The only exception to this is that the ATUS asks respondents to go back over the day and report about childcare and eldercare activities.

Time diaries often ask additional questions related to the context of time use. For example, the current ATUS asks questions such as, "Who was in the room with you?" and "Where were you while you were [ACTIVITY]?" These types of additional questions can be incorporated into a web instrument easily if the questions are common for each reported activity. Even if the additional questions are conditional on the type of activity that is reported, the web instrument should be able to incorporate flows and skips that ask these contextual questions, but it may require more screens to be programmed per reported activity (Houle, 2014). The Canadian Time Use Survey web pilot has maintained a multiple screen approach to incorporate these flows.

Another issue to consider is whether the instrument needs to include any probes or follow-up questions to ensure data quality. For example, the current ATUS asks probes about any activity that lasts more than 2 hours, with the exception of sleeping, working, or attending high school. It requires the interviewer to verify the activity by asking the question: Did you stop (activity) to do anything else at that time? Work activities that last more than 4 hours generate an instrument pop-up requiring the interviewer to ask the respondent if he/she took any breaks of 15 minutes or longer. If a respondent reports sleeping more than 10 hours, the interviewer must verify the duration of the sleep activity. Another automated probe is for respondents who do not report any eating or drinking activity in the diary so that interviewers must verify that the respondent did not eat or drink on the diary day. ATUS interviewers are also trained to capture sufficient detail for a number of other activities; these probes are not automated. It is unclear to what extent existing web time use diaries utilize these types of probes; however, it seems likely that web instruments would be able to perform data quality checks like those in the current CATI instruments.

Another potential difference that could be introduced between the existing ATUS and a web diary is the reporting period. The literature describes the use of "yesterday" and "tomorrow" diaries. Yesterday diaries have respondents construct how they spent their time during the previous 24 hours. Tomorrow diaries involve the respondent recording his or her activities during a pre-specified day (United Nations, 2013). The current Eurostat guidelines advocate tomorrow diaries (Eurostat, 2009). The current ATUS asks about the previous 24 hours starting at 4 AM the previous day to 4 AM the day on which the respondent is called. It may make more sense to approach the respondent in advance about filling out the diary on a pre-specified day. This would mean the diary would be open for the respondent to report on that day. Respondents could enter the activity at any time during the day shortening the actual recall period. A decision would have to be made about how long the diary should be left open for reporting. This deviation in reporting periods could be a source of mode differences; however, the available research suggests that yesterday and tomorrow diaries produce similar estimates (Gershuny 1995; Robinson and Godbey, 1999).

The ATUS currently allows for respondents to answer about their time use on a specific diary day in order to adequately represent time across days of the week. This can also be easily replicated on the web, but it is worth mentioning that web diary collection has the additional benefit of being able to easily and without monetary cost increase the number of diary days. All respondents, or just a subsample of respondents could be asked to complete the additional diary days. On the other hand, increasing the number of diary days would increase response burden for the respondent and could have deleterious effects on response rates.

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Mobile Devices

The introduction of mobile devices has complicated the collection of data over the web somewhat. There may be relatively minimal impact for some devices such as tablets; however, the limited screen space available can make it difficult to perform some survey tasks (Peytchev and Hill, 2010). For example, grids may be difficult or impossible to implement on a small screen. Some have developed apps that can be used to measure time use on smartphone devices (e.g. Sonck and Fernee, 2013). One needs to consider that some respondents will attempt to complete the diary over their phone as these devices become more popular. Although these devices present certain challenges, they also present opportunities for time use measurement. For example, respondents carry their smartphones with them most of the time. Hence this makes it possible to record time use in more or less real time, and also makes it possible to send notifications to respondents to implement experience sampling techniques (Sonck and Fernee, 2013).

Data Quality

Several of the studies we reviewed provided information about the quality of the data collected over the web versus more traditional modes such as paper or telephone. Most of these studies present evidence that time use surveys conducted online over the web or through the use of mobile apps can produce data of similar quality to existing modes of data collection; however, the literature would benefit from more experimental comparisons to draw stronger conclusions about the comparability of data quality across modes.

Data quality in time use studies is often measured by metrics such as number of activities reported, the sequence of the activities reported, the number of simultaneous activities reported, or the completeness of the data. Bonke and Fallesen (2010) report a higher number of activities and sequences reported using the web-based instrument compared to telephone and conclude that the web-based instrument produces better data quality. These findings occurred in the context of a mixed-mode design rather than an experimental comparison; however, the differences still occurred even after controlling for socio-demographic characteristics such as gender, age, education, and labor market status. A pilot of 51 families in the UK Millennium Study found that there were 21 weekday episodes reported for a web diary versus 19 for paper and 16 for a mobile app (Chatzitheochari, 2014). No significance tests were reported for the study so it is not possible to tell whether these results are statistically significant. This same study found that the number of full productive diaries was similar for diaries completed online over the web, through an app, or on

paper. Sonck and Fernee (2013) report that the DTUS smartphone pilot found that the number of activities reported using the smartphone app was similar to the number of activities reported on previous surveys of the Dutch population. On average, respondents reported 27 episodes in the pilot test of the app in 2011, which was more than was reported in the 2005 DTUS (24) but fewer than was reported in the 2006 DTUS (34). Both the 2005 and 2006 surveys were collected using paper-administered diaries.

The Study of Use of Products and Exposure Related Behavior (SUPERB) suggests that information of similar quality can be collected by web and telephone diaries. This study involved several contacts over an 18 month period. Everyone first completed one weekday diary and one weekend day diary over the telephone. The respondents completed one weekday diary and one weekend day diary per quarter online for the remainder of the study period. Less than one percent of both the web and phone diaries were incomplete (Wu et al., 2012). Some differences were found between the telephone and web diaries. For example, the first year telephone diaries reported a significantly higher number of location-activity records compared to the web diaries. Other differences were corrected by design changes. First, there were more instances of implausible sleep hours (e.g. <3 hours or > 16 hours) entered in the web diaries compared to the telephone diaries. Some of these were caused by data entry errors by the respondent, but the initial diary also did not allow the user to edit reported information. In addition to allowing the respondent to edit information, adding a warning message decreased the differences in reported sleep between the telephone and web diaries. Second, the web diaries included less time spent in transit and more missing transit records. A change to the web diary that added a warning if the respondent failed to enter transit between stops resulted in fewer missing transit records so that there were no longer significant differences between the telephone and web diaries.

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Review of Surveys Measuring Time Use Over the Web 5

We reviewed several studies that have used self-administered web-based diary collection methods. There are a number of countries that are considering web-based applications for time-use surveys (United Nations Economic Commission for Europe, 2010). The available literature provides information on a number of pilot studies or development efforts that are underway to incorporate web-based data collection. These efforts are at various stages in the development process. We found many of these articles by using search engines such as Google or Google scholar. We also reviewed the references of articles that we found. Our goal for this literature review was to collect as much information as possible about the entire survey process including contact procedures, use of incentives, and instrument design, but many of the reviewed surveys do not have complete documentation. In addition, the published literature is currently sparsely populated with examples of web time use diaries. Hence, much of the research we reviewed is in conference presentations or other documents that were obtained either online through Internet searches or through communication with the study directors. Table 2 reviews the information that we learned about each survey.

Overall Designs of the Reviewed Studies

There are a number of different types of studies that we reviewed using different study designs depending on the research goal. Researchers from Belgium using the Modular Online Time Use Survey (MOTUS) tool have conducted a time use survey over the web alongside a paper and pencil diary study in order to benchmark the data collected over the web with a traditional data collection method (Joeri et al., 2013). Researchers from the Netherlands undertook a feasibility study to understand the use of smartphones to collect time use data (Sonck and Fernee, 2013; Fernee and Sonck, 2013; Fernee and Scherpenzeel, 2013). Other studies utilized a mixed-mode approach that combined web data collection with another more traditional mode such as telephone or paper by either offering respondents an option to switch to the web or transferring everyone to the web (Bonke and Fallesen, 2010; Wu et al., 2012; Chatzitheochari, 2014). The type of online survey may also vary within these mixed-mode designs. While most of the studies used traditional web instruments or mobile apps, Japan conducted their Survey on Time Use and Leisure Activities in 2011 and included an option to complete an electronic questionnaire instead of a paper questionnaire. The electronic questionnaire was delivered as a downloadable spreadsheet.

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Table 2.   Summary of time diary surveys reviewed

Survey	Modes	Study type	Contact procedures	Incentives	Nonresponse follow-up	Response	Input	Context	Probes	Sample	Level of detail of activities	Other Information
Modular Online Time Use Survey (MOTUS)– Belgium	Web	Pilot	Letter with link to website and instructions	Lottery	E-mail, SMS	NA	Precoded list, keyword search	Location, Others present, transport mode	NA	40,000 adults (ages 18-75) from the Belgium population register	225 precoded activities	Special modules can be added
Dutch Time Use Survey (DTUS)	App	Pilot	Letter with instructions	Panel reward points	Notifications through app	NA	Precoded list, open	Others present	NA	150 adults from a market research panel	41 precoded activity categories	GPS, experience sampling
Canadian Time Use Survey	Web	Pilot	NA	NA	NA	NA	Precoded list	Location, Others present,	Probes for travel activity	For actual production fielding, one person age 15+ will be selected per household from a telephone frame. The telephone frame is generated from the Canadian Census and other government administrative records.	72 activity codes that roll up to 14 activity categories	Use of technology, Mood
UK Millenium Cohort Study	Web, App, Paper	Pilot	NA, Time use paper for memory aid when Internet access not available.	NA	Text reminders	70% participation from existing panel	Precoded list	Location, Others present, satisfaction		Teens age 14 from Wave 6 of the Millenium Cohort Study. 50 teen in the pilot test and 100 teens in the dress rehearsal.	44 activity codes that rolled up to 12 broad activity groupings	NA

Table 2.   Summary of time diary surveys reviewed (continued)

Survey	Modes	Study type	Contact procedures	Incentives	Nonresponse follow-up	Response	Input	Context	Probes	Sample	Level of detail of activities	Other Information
Danish Time Use and Consumption Survey	Web, Telephone, mixed-mode	Pilot	Letter with choice of telephone or online	Lottery	Telephone reminders with no online complete	48%; 20% of completes online	Precoded list	NA	NA	Adults ages 18-74 randomly selected from the administrative records held at Statistics Denmark. The final sample size was 6,000 completed interviews.	"Pre-coded system" with key word search.	NA
Study of Use of Products and Exposure Related Behavior (SUPERB)–California	Web, Telephone	One time study	Web survey accessed through study website with log-in	Lottery	NA	16% for parents of young children, 49% older adults	Precoded list	Location	Probes for travel and sleep activity	186 households in CA with a child age 8 or younger. Sample randomly drawn from birth certificates of children born between 2000-2005. 64 adults ages 55 or older randomly selected from tax assessors' housing units records.	No discussion of codes or open field entry	NA
Japanese Survey on Time Use and Leisure Activities	Paper, electronic questionnaire	Production	Part of sample offered option of downloadable questionnaire	NA	NA	300/10,700 completes via electronic questionnaire	NA	NA	NA	Multi-stage nationally representative sample of households in Japan. Household members of age 10 and over completed the survey.	Part of sample completed a pre-coded form and the other part of the sample completed a free entry for.	NA

Contact Procedures

A variety of information is provided to respondents in the process of contacting households for participation in a Web survey. It was typical for studies to send an introductory letter to the respondents. The content of the letter varied across the projects that we reviewed. In addition to stressing the importance of the survey and mentioning incentives, some included other motivational techniques. For example, the pilot for the MOTUS in Belgium informed the selected household that they would receive an overview of their time use and a comparison of their own time use with the remainder of the population (Joeri et al., 2013). In addition, the MOTUS provided links to the website where the respondent could find an introductory video on the web page that stressed the societal importance of the survey. Some studies talked specifically about the log in procedures for completing the web diary. For example, Wu et al. (2012) describe the log in procedures for the SUPERB study, which required participants to access the web survey through a study website with a unique ID and password. The Danish Time Use and Consumption Survey utilized a mixed-mode design that included an introductory letter offering the sampled household the choice of completing a telephone interview lasting 10-15 minutes or completion of a questionnaire on the web with an access code (Bonke and Falleson, 2010).

Instructional materials were also commonly sent to sample households to help respondents understand how to use the web tool to record their time use. The amount and nature of the material varied across studies. The Dutch Time Use Survey (DTUS) tested the use of a smartphone app (Fernee and Sonck, 2013; Fernee and Scherpenzeel, 2013; Sonck and Fernee, 2013). The participants were recruited from an online panel and were sent several materials in addition to an introductory letter. For example, the participants were sent a paper manual describing how the app worked. The participants could also access a YouTube video that demonstrated the use of the app. This study also provided smartphones to participants who did not own their own smartphone so there was also a YouTube video that explained how to use the smartphone. Helpdesk support was also available for respondents who encountered difficulty with the app. The UK Millennium study gave 51 respondents recruited from wave 6 of a longitudinal study the choice of completing a diary for two diary days either over the web or through a mobile app (Chatzitheochari, 2014). A paper diary was offered to those who did not have Internet access. The respondents were provided mode-specific leaflets with instructions.

Studies also included detailed information and materials to support the completion of the time use diary. For example, the self-administered task of entering time use categories requires the respondent to be familiar with the coding scheme. Hence, the DTUS provided a paper list of time

use activities (Sonck and Fernee, 2013). The UK Millennium Cohort Study collected data through an app and also from web users. Both groups were provided a paper time use notebook to keep a record of their activities in case they could not access the diary on the allocated day (Chatzitheochari, 2014).

Incentives

Incentives were common for participating in the time use surveys that were conducted over the web. The type of incentives used differed from the typical cash incentives. Lotteries were often used to encourage sample households to participate in the survey. The MOTUS pilot in Belgium used a lottery consisting of one hundred prizes ranging from 10-500 Euros raffled each month among those who completed the surveys (Joeri et al, 2013). SUPERB offered an unspecified incentive and entered respondents in a raffle to encourage retention in the study which required completing several time use diaries over an 18 month period (Wu et al., 2012). The DTUS smartphone pilot recruited respondents from a panel and used loyalty points for the panel as an incentive (Sonck and Fernee, 2013). There was no experiment to determine whether these incentives were effective or not.

The Danish time use and consumption survey used incentives in the context of a mixed-mode design. The survey required the sample adult and other household members to complete a demographic questionnaire, time use survey, and a consumption booklet about the expenditures by members of the household. They also utilized lottery incentives. For the first six months of the survey, respondents that were interviewed participated in a lottery with three prizes (one prize of 5000 Danish krone, two prizes of 1000 Danish krone) if they filled out the questionnaire, diary, and booklet. This lottery was announced in a letter that was sent out in the consumption booklet, which was mailed after completion of the questionnaire and diary. After six months the lottery prizes were increased (one prize each of 10,000, 5,000, and 2000 Danish krone). In addition, the prizes were doubled if the respondents completed the instruments on the web. Finally, cinema tickets to all family members were offered if they filled out the remaining non-completed instruments. Bonke and Falleson (2010) present model-based evidence that the use of these incentives increased the response rate by 10 percent.

Nonresponse Follow-up

An advantage of electronic data collection is the possibility of sending reminders to participants who have not completed the survey. The MOTUS pilot asked respondents to provide their e-mail address and mobile telephone numbers when they logged on to the website for the first time (Joeri et al, 2013). This gave the study an opportunity to send customized e-mail messages or SMS messages to respondents who started their diary but did not finish. The diaries were completed continuously throughout the day with the peak reporting times being 8 am and 10 pm. Sonck and Fernee (2013) report that for the DTUS "If no activities were recorded in the smartphone diary for two hours, a notification was sent to respondents to remind them about completing the diary up to the most recent activity" (p. 26). The UK Millennium Cohort Study sent text reminders about completing and submitting the diary (Chatzitheochari, 2014).

Reminders using more traditional modes of data collection may also be used with web data collection. The Danish time use and consumption survey used telephone follow-ups at the beginning of the survey period in its mixed-mode design (Bonke and Fallesen, 2010). The sample of adults was drawn from a register maintained by Statistics Denmark. Selected adults were sent a letter offering them the choice to complete the survey either by telephone or web. Respondents who had not completed the survey after one week using the web instrument were given a telephone reminder to complete the survey and were also offered the option of completing the interview on the telephone. There were up to nine reminder calls per selected person.

Response

We found response rates reported for two of the surveys that were reviewed. The UK Millennium Study reported an overall participation rate of 70 percent. The participation rate was 75 percent for the first diary day and 65 percent for the second diary day (Chatzitheochari, 2014). As shown in Table 2, the sample for this study consisted of participants from an existing panel. The mixed-mode (telephone and web) Danish time use and consumption survey reported a 48 percent response rate for the time diary portion of the survey, which was similar to the 49 percent response rate achieved by the Dutch time use survey using paper only (Bonke and Fallesen, 2010). Approximately one in five respondents completed the time use diary over the web. The Japanese found an even lower proportion of respondents choosing a downloadable electronic questionnaire over a traditional paper diary. Only 300 out of 10,700 respondents chose the electronic questionnaire. Wu et al. (2012) found that 16 percent of parents and children completed all questionnaires across their entire 18

month study, whereas 49 percent of older adults completed all questionnaires. This difference most likely reflects the increased burden for parents of young children since they had to fill out multiple surveys rather than any bias in preference for the mode.

Input Type

Accurately recording time use can be a challenge in self-administered diaries. In contrast to the current ATUS where an interviewer who is trained and familiar with the time use coding scheme, respondents using self-administered modes may have difficulty understanding what exactly to record in the diary. However, many self-administered instruments use a similar style coding scheme that the respondents can use to categorize their time use activity. The images of the diaries shown in the appendixes provide detailed examples of how these coding schemes work in practices. We briefly describe some of these approaches in this literature review.

In general, most of the surveys we reviewed used some kind of hierarchical list for the respondent to code their time use into. Many of these designs are based on some variant of a "light diary" where a reduced set of time use categories captures the most relevant time use activities; however, the exact codes vary from study to study (Pääkkönen and Väisänen, 2012). For example, in the web diary that was developed for the Canadian Time Use Survey, respondents reported what they were doing using 72 "Light diary" codes that roll up to 14 high level activities (Houle, 2014). Respondents were then asked how long the activity lasted. Ten-minute time intervals were used. The Canadian instrument also collected up to two pre-defined simultaneous activities per main activity. The organization of the categories can have an important impact on what actually gets recorded by the respondent. For example, evaluation of the Canadian Time Use Survey revealed that including travel as a category under all major headings helped to reduce the number of times travel was omitted. The number of pages used to collect this information varied over the development of the diary. The initial seven-page diary design utilized mostly radio buttons to select categories and allowed for flows, dynamic text, and edits, but this design was viewed as burdensome. The instrument was reduced to a two-page design that utilized drop-down boxes and also allowed for flows and edits. Developers found a one-page design to be insufficient since it did not allow for flows and edits.

Both the web instrument and the app in the UK Millennium Cohort Study included a hierarchical list of 44 activities under 12 top-level groupings. The app is designed for a question by question format beginning with what were you doing, where were you, who were you with, and how much did you like [activity]. After each activity is entered the respondent can see everything that has been

entered up to that point. In contrast, the web instrument is presented as a time grid (Chatzitheochari, 2014).

The other surveys reviewed also included some type of precoded hierarchical list. Even within this type of presentation, there may be different options for enabling respondents to code time use activities. The MOTUS allows the respondent to either point-and-click on the list to select the activity or search for keywords that might guide the respondent to the correct activity (Joeri et al., 2013). For example, a respondent could select "personal care" and then "sleep" or the respondent could just type in "sleep" using the key word search and find the appropriate category that way. The mobile app developed for the DTUS included a precoded hierarchical list, but also allowed users to type in their activity in an open-ended field (Sonck and Fernee, 2013).

Contextual Questions

All of the surveys we reviewed collected answers to contextual questions in addition to time use. The MOTUS prototype included questions about the location of the respondent, who the respondent was with and the transportation mode when transportation was selected (Joeri et al, 2013). The UK Millennium cohort study collected how much the respondent liked an activity in addition to where the respondent was located and who they were with (Chatzitheochari, 2014). The SUPERB study asked whether the activity occurred indoors, outdoors, or in a motorized vehicle, in addition to where the respondent was located (Wu et al., 2012). The DTUS collected whether the respondent was alone or with someone that he or she knew (Sonck and Fernee, 2013). There were plans for the Canadian Time Use Survey to measure whether or not the respondent used a tablet, smartphone, computer or laptop, how pleasant an activity was, where the respondent was located, and who the respondent was with in their Fall 2014 pilot survey (Houle, 2014).

Probes, Editing, and Follow-up Questions

Web data collection shares the advantages of computerization with CATI data collection. This has two implications for the ATUS. First, it means that the two modes can incorporate skip patterns or appropriate follow-ups conditional on the type of time use activity that the respondent reports. This was a design element that motivated the Canadians to consider multiple-page versions of their web instrument that would allow for flows, dynamic text, and edits (Houle, 2014). Second, the web instrument can mimic some of the probing and editing behavior of the CATI instrument. Our

review of time use studies using web data collection suggests that this is an important aspect to consider in terms of data quality. The SUPERB study found that including follow-ups about travel and sleep activity helped to eliminate differences in data quality between telephone and web data collection (Wu et al., 2012). The Canadian Time Use Survey also planned to probe for missing travel activity in their pilot study when different locations are entered without any travel in between (Houle, 2014).

Other Information Collected

The use of mobile devices to collect time use data may have some particular advantages to collecting supplemental data for time use purposes. The DTUS smartphone pilot used the GPS feature of the smartphone to track location information of respondents who gave their consent to collect such information (Sonck and Fernee, 2012; Fernee and Scherpenzeel, 2013). The app also allowed for the possibility of experience sampling throughout the day so that researchers could understand how respondents were feeling at certain times of the day and then correlate this information with time use activity. For example, the app would send a notification to the respondent at particular times of the day and ask the respondent to report his or her mood.

Summary

There are a few lessons that can be learned from this review of time diary surveys using web data collection methods. First, web data collection has been explored using both single- and mixed-mode designs. Second, it is common for introductory material to include detailed instructions and support concerning how to complete the web survey. Third, there is very little guidance about the level of response to web time diary surveys from the existing literature; however, the mixed-mode design utilized by Bonke and Fallesen (2010) demonstrates that the response rate can be similar to previous time use studies using a single mode. Bonke and Fallesen also found that only about one in five respondents chose to complete their diary over the web. Fourth, lottery incentives were the most common type of incentive used for web time diary surveys. Bonke and Fallesen (2010) provide some evidence that these incentives work, but there is currently a dearth of evidence from the existing literature to support this finding. Also, regarding response, it is noteworthy that nonresponse follow-ups and reminders are relatively easy with web data collection once the requisite contact information (e.g., email addresses) has been collected. Finally, there are many aspects of web data collection that need to be evaluated to improve comparability between web data collection and telephone

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collection. For example, simpler coding categories will probably be necessary for self-administration. Contextual questions, follow-ups, or probes can be asked in much the same way as on the telephone, but the use of these condition questions will need to be considered specifically in the design since it may influence the number of screens that may be needed for flows and edits.

Lessons Learned From Other Related Research

Future Mobility Survey. The Future Mobility Survey (FMS) is a travel survey that used a GPS app loaded on to the respondent's smartphone to track the respondent's travel. The GPS data were uploaded to a central server and the server mapped and analyzed the GPS data. The respondent was then prompted in an on-line recall task to provide detail about the processed GPS data. The FMS found that the battery life of a smartphone was a significant challenge since the GPS app demanded much of the smartphone's battery capability. The FMS also found that the web interface for the recall task needs to be as simple and intuitive as possible since there is no interviewer to assist the respondent with the recall task.

Web Mode Test for the Consumer Expenditure Diary Survey. At present, the CE production diary is paper-based. In 2013, BLS conducted a 3-month feasibility test of a web CE diary. In the main, the current version of the CE web Diary functioned well and met the objectives originally defined by BLS. On the other hand, the current version of the web Diary is not ready for production. Findings from the test of the CE web Diary include the following findings:

- Response rates were lower for the web Diary than for the corresponding rates in the production paper-based diary.

- There were also overall fewer expenditures (median of 13 fewer expenditures) reported for the web Diary than for the production paper-based diary.

- On the other hand, the web Diary respondents reported higher median expenditure amounts for certain sections and exhibited lower item nonresponse than the CE production paper-based diary.

- The web diary test demonstrated the importance of flexible and easy usernames and passwords, since the usernames and passwords proved problematic for a number of respondents.

- Web diary respondents should be allowed to continue reporting a day or so after the final day of data collection.

- Web diary paradata should be examined on a daily basis to identify respondents who have not logged on and to note the number of days since last logon.

Life in a Day App. The National Cancer Institute (NCI) along with Westat developed the Life in a Day mobile phone diary-based app for capturing time spent in daily activities. With a goal of improving the quality of self-reported physical activity behavior, the app was designed to allow subjects to report their daily activities either in real time or retrospectively.

NCI followed best practice principles in developing the app and did not provide a tutorial for respondents to learn how the app worked. In usability testing, the app proved not to be sufficiently simple or intuitive to learn. Respondents had trouble leaning some of the basic features of the app and others never discovered some of the basic features. This again points to the extreme importance of making the app simple and self-evident.

The usability testing also showed that the registration process for the app was highly burdensome and could deter some respondents from participating in the survey. Further, the app allows respondents to customize activity buttons. But the customization process proved so burdensome that some respondents chose to use the pre-designated buttons, thus providing less detailed information. The timer feature was not easy to use and some respondents found that the times recorded for their activities were inaccurate.

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Conclusion 6

This literature review was undertaken to inform the design of a web instrument that could be used in a mixed-mode design in the ATUS. We briefly reviewed the current features of the ATUS relevant for the design. We also reviewed the literature illustrating potential sources for error related to coverage, nonresponse, and measurement error for a web instrument in a mixed-mode design for the ATUS. Finally, we reviewed several surveys that are using web instruments to measure time use.

The literature suggests that including web in a mixed-mode design is feasible. Other countries have implemented a similar approach (e.g., Bonke and Fallesen, 2012); however, there are a number of issues that will need to be addressed with the introduction of a new mode in the ATUS. Nearly all of the studies we reviewed are pilot studies that have not been implemented in a production environment. Therefore time use studies with extensive experience with web collection are still rare. Many of the issues that need to be addressed concern how closely the web can measure time use in way that is consistent with the current design using telephone data collection. The current literature offers some guidance about how self-administered data collection may relate to the current telephone administered design, but there are many areas that need further research. For example, the data will need to be evaluated to understand if socially desirable or undesirable behaviors are reported at different rates between the web and telephone modes. Likewise, there will need to be research about whether a light diary approach with precoded categories can capture data similar to the current ATUS activity data detail. In addition, the current mode research is still coalescing around the best strategy for pushing respondents to complete the survey on the web. Hence, ATUS will want to carefully consider different options for combining the two modes together.

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References

Bonke, J., & Fallesen, P. (2010). The impact of incentives and interview methods on response quantity and quality in diary-and booklet-based surveys. In Survey Research Methods, 4 (2), 91-101.

Bosnjak, M., & Tuten, T.L. (2002). Prepaid and promised incentives in Web surveys – an experiment. *Social Science Computer Review*, 21, 208-217.

Bureau of Labor Statistics. (2013). American Time Use Survey User's Guide. Washington D.C.: Bureau of Labor Statistics.

Cantor, D., Brick, P.D., Han, D., & Aponte, M. (2010). Incorporating a web option in a two-phase mail survey. Paper presented at the 60th Annual Conference of the American Association for Public Opinion Research., Miami Beach, FL, May.

Chatzitheochari, S. (2014). Measuring teenage time use in the UK Millennium Cohort Study: A mixed-mode approach. Paper presented at the IATUR Conference., Turku, Finland, July.

Couper, M. P., Tourangeau, R., & Kenyon, K. (2004). Picture this! Exploring visual effects in web surveys. *Public Opinion Quarterly, 68*, 255-266.

Crawford, S.D., McCabe, S.E., Saltz, B., Boyd, C.J., Freisthler, B., & Paschall, M.J. (2004). Gaining respondent cooperation in college web-based alcohol surveys: Findings from experiments at two universities. Paper presented at the 59th Annual Conference of the American Association for Public Opinion Research., Phoenix, AZ, May.

Eurostat (2009). Harmonised European Time Use Surveys: 2008 guidelines. Luxembourg: Office for Official Publications of the European Communities.

Fernee, H. & Scherpenzeel, A.C. (2013). The smartphone in survey research: experiments for time use data. *The Survey Statistician*, 19-25.

Fernee, H. & Sonck, N. (2013). Is everyone able to Use a smartphone in survey research? Tests

with a time-use app with experienced and inexperienced users. Survey Practice 6(4). Retrieved from http://www.surveypractice.org/index.php/SurveyPractice/article/view/245/html. Gershuny, J. (1995). "Time budget research in Europe". Statistics in Transition 2 (4), 529–551.

Gershuny, J. (2011). Time-Use Surveys and the Measurement of National Well-Being. Centre for Time-use Research. Department of Sociology, University of Oxford.

Goritz, A.S. (2006). Incentives in web studies: Methodological issues and a review. *International Journal of Science*, 1, 58-70.

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Harmon, M.A., Westin, E.C., & Levin, K.Y. (2005). Does type of prenotification affect web survey response rates? Paper presented at the 60th Annual Conference of the American Association for Public Opinion Research., Miami Beach, FL, May.

Heerwegh, D. (2005). Effects of personal salutations in e-mail invitations to participate in a web survey. *Public Opinion Quarterly*, 69, 588-598.

Houle, P. (2014). Innovations in measuring time use in Canada: Developing a self-administered electronic diary. Paper presented at the IATUR Conference., Turku, Finland, July.

Joeri, M., Ignace, G., van Tienoven, T. P., & Djiwo, W. (2013). MOTUS: Modular online time-use survey. NTTS 2013 - New Techniques and Technologies for Statistics. Retrieved from http://www.cros-portal.eu/sites/default/files/NTTS2013fullPaper_184.pdf.

Joinson, A.N., & Reips, U.D. (2007). Personalized salutation, power of sender and response rates to We-based surveys. *Computers in Human Behavior*, 23, 1372-1383.

Joinson, A.N., Woodley, A., & Reips. U.D. (2007). Personalization, authentication, and self-disclosure in self-administered Internet surveys. Computers in Human Behavior, 23, 275-285.

Kaplowitz, M.D., Lupi, F., Couper, M.P., & Thorp, L. (2012). The effect of invitation design on web survey response rates. *Social Science Computer Review*, 30, 339-349.

Lozar Manfreda, K., Bosnjak, M., Berzelak, J., Haas, I., & Vehovar V. (2008). Web surveys versus other survey modes: A meta-analysis comparing response rates. *International Journal of Market Research*, 50, 79-104.

McGonagle, K. (2013). Survey breakoffs in a computer-assisted telephone interview. Survey Research Methods, 7(2), 79-90.

Medway, R. L., & Fulton, J. (2012). When more gets you less: A meta-analysis of the effect of concurrent web options on mail survey response rates. Public Opinion Quarterly, 76(4), 733-746. Retrieved from http://poq.oxfordjournals.org/content/76/4/733.full.pdf+html.

Millar, M. M., and Dillman, D. A. (2011). Improving response to Web and mixed-mode surveys Internet using address-based sampling and mail contact procedures. *Public Opinion Quarterly, 75*, 249-269.

Minnen, J., Glorieux, I, van Tienoven, T., Daniels, S., Weenas, D., Deyaert, J., Van den Bogaert, S., Rymenants, S. (2014). Modular Online Time Use Survey (MOTUS) – Translating an existing method in the 21st century. *International Journal of Time Use Research*, 2014, 73-93.

Pääkkönen, H. and P. Väisänen (2012). Comparison of results from light diaries and full-scale diaries in the Finnish time use survey. Statistics Finland (unpublished).

Peytchev, A. (2009). Survey breakoff. *Public Opinion Quarterly*, 73, 74-97.

Robinson, J.P., G. Godbey (1999). Time for Life. The Surprising Ways Americans Use Their Time. Second edition. University Park: The Pennsylvania State University Press.

Shih, T.H., & Fan, X. (2008). Comparing response rates from web and mail surveys: A meta-analysis. *Field Methods*, 20, 249-271.

Singer, E. (2002). The use of incentives to reduce nonresponse in household surveys. In R.M. Groves, D. Dillman, J.L. Eltinge, & R.J.A. Little (Eds.), Survey Nonresponse (pp. 163-177). New York: John Wiley.

Sonck, N. & Fernee, H. (2013). Using smartphones in survey research: a multifunctional tool Implementation of a time use app; a feasibility study. The Netherlands Institute for Social Research/SCP, The Hague.

Tourangeau, R., Conrad, F.G., & Couper M.P. (2013). *The Science of Web Surveys*. New York: Oxford.

Tourangeau, R. & Yan, T. (2007). Sensitive questions in surveys. Psychological Bulletin, 133, 859-883.

United Nations Economic Commission for Europe Conference of European Statisticians (2013). Guidelines for harmonizing time use surveys (Meeting Minutes). Third Meeting of the 2012/2013 Bureau. Luxembourg, 5-6 February 2013.

Wu, X., Bennett, D.H., Lee, K., Cassady, D.L., Ritz, B., & Hertz-Picciotto, I. (2012). Feasibility of using web surveys to collect time-activity data. Journal of Exposure Science and Environmental Epidemiology, 2012, 116-125.

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Part II
Design Task

The American Time Use Survey (ATUS) is a unique source of information about the amount of time that Americans spend on a diverse range of activities including nonmarket activities like housework. The sample is drawn from households that have completed the final round of the Current population Survey (CPS). A designated person (DP) from the CPS panel, age 15 and older, is selected and assigned a specific day of the week to report for. The respondent reports for a 24-hour time diary about "yesterday." The interview is conducted using computer-assisted telephone interviewing (CATI).

The ATUS interview includes questions about (1) the composition of the household, (2) the respondent's labor force and school enrollment status (3) the 24-hour time diary about "yesterday" and (4) summary questions about specific topics of interest.

The Bureau of Labor Statistics is interested in pursuing a mixed-mode design that includes the collection of data via a web instrument. This document outlines a design proposal for implementing a mixed-mode approach in ATUS consisting of both web and CATI data collection. Three design elements are covered in this proposal:

- Allocation of respondents to mode: A sequential mixed-mode design is proposed to maximize the use of the web mode.

- Contact procedures for a mixed-mode design: Recruiting designated persons to participate in the ATUS will require some modifications to the contact procedures that are currently employed on ATUS. Either advanced letters or e-mails, if available, may be used to contact the designated person. The designated person can be switched to telephone data collection if efforts to recruit via the web are unsuccessful.

- ATUS Diary design for web collection: The ATUS instrument includes a number of features that may need to be adapted or modified for web data collection including the activity classification, level of detail that is collected, follow-up questions, clean-up probes, and the collection of secondary activities such as child care or eldercare.

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Allocation of Respondents to Mode | 2

The current ATUS design conducts all interviews by CATI. Designated persons from households that provided a telephone number to the Census Bureau and completed the eighth interview of the CPS are called to complete the interview over the telephone. Each respondent is assigned a designated diary day and is called on the day after their designated diary day. Designated persons from households that did not provide a telephone number are asked to call the telephone center on a designated day to complete the ATUS interview. The designated person has up to eight weeks to complete the interview on their designated day of the week. Throughout this proposal we assume that ATUS will continue using the designated day approach.

One of the main goals of any mixed-mode design for the ATUS using both web and CATI modes should be to maximize the number of participants who complete the diary online. Maximizing response via the web would help to minimize the cost of the mixed-mode design since the marginal cost for adding a CATI respondent is much higher than the marginal cost of adding an additional web respondent.

Researchers have tried both concurrent and sequential mixed mode designs. In the concurrent mixed-mode design, the designated person would be simultaneously offered the option of completing the interview using either web or CATI. There is a gathering consensus in the literature that offering a choice of modes may actually hinder response. Although several hypotheses have been offered about why this is the case, the exact reason for this lower response is unknown at this time (Medway and Fulton, 2012). For example, it is possible that offering two modes simultaneously adds complexity and burden to the decision to participate.

Another approach is a sequential mixed-mode design where all respondents are given the opportunity to complete the survey in a single mode initially, typically an inexpensive mode, but are followed up in another mode. A study by Millar and Dillman (2011) presents evidence that sequential strategies that push the web mode more strongly in earlier contacts can achieve similar response rates and lead to a higher proportion of respondents completing the survey over the web compared to designs that stress other modes (e.g., mail) early and web later. Bonke and Fallesen (2010) present an example of a mixed-mode design in the context of time diary research that is not strictly sequential, but encourages the use of the web mode first. Sample households in their study

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were asked to first complete a background question. Next, they were asked to complete two forms for daily time use – one for a weekday and one for a weekend day. Finally, sample households were asked to complete a booklet about their previous month's spending. Sample households were sent a letter offering the choice of a 10-15 minute telephone interview or a web survey with an access code. The sample households were given one week to complete the interview over the web. Households were then called and asked to complete the survey over the telephone if the web questionnaire had not been received within one week. They achieved a similar level of response to a previous time use survey of the Danish population in 2001 conducted on paper by mail. The design led to about one fifth of the respondents completing the time diary over the web. The Bonke and Falleson study design also included lottery incentives that were higher when the interviews were completed over the Web rather than by telephone. They estimated the average treatment effect of the incentives in this increased the response rate by ten percent.

We recommend that the ATUS follow a sequential mixed-mode design that pushes the designated person to complete the interview via the web first and then switches to CATI data collection after a pre-specified number of attempts has resulted in a non-interview. Ideally, information from the CPS frame could be used to help allocate designated persons between CATI and web modes. For example, ideally the CPS frame would include e-mail addresses and information about web access. However, this type of information is not asked about in the current CPS interview. The CPS interview does include information that is predictive of web access such as age, household income, and education. This information could be used to tailor contact strategies for those who do not respond to the initial request to complete the diary on the web. We will now present procedures for contacting respondents using a mixed-mode design.

Contact Procedures 3

Under the current ATUS design, the ATUS designated person is sent an advance mailing to notify them that they have been selected for the ATUS sample. The mailing contains a letter printed in both English and Spanish. The purpose of the letter is to explain the nature of the survey, notify the designated person of day of their interview, and provide ATUS telephone, e-mail and Internet contact information. The letter that is sent to households without telephone numbers is also accompanied by a $40 inactive ATM debit card. The mailing also includes a brochure that provides answers to some frequently asked questions about the survey.

Table 1 shows a proposed pattern of contacts for a mixed mode design. This design varies depending on the week that the case is in the sample, whether or not a telephone number is available for the household, and the likelihood of the designated person being a web user. The diary day in Table 1 refers to the actual day that the respondent is to complete the diary about.

Table 1.   Contact procedures for mixed-mode design

Week	Day	Telephone HH		Non-telephone HH
		High Web Use	Low Web Use	
1	7 days before diary day	Advance mailing	Advance mailing	Advance mailing
	1 day after diary day (if not complete)	Replacement letter	Replacement letter	Replacement letter
2	1 day after diary day (if not complete)	Replacement letter	Switch to phone for remaining weeks; calls begin on the day after the diary day on week three	Replacement letter
3	1 day after diary day (if not complete)	Switch to phone for remaining weeks; calls begin on the day after the diary day on week four	Interviewer calls for interview on day after diary day	Switch to phone for remaining weeks; Send letter with pre-paid calling card and call-in number
4-8	1 day after diary day (If not complete)	Interviewer calls for interview on day after diary day	Interviewer calls for interview on day after diary day	Respondent calls in for interview on day after diary day

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Many of the existing ATUS materials would still be helpful for the mixed-mode design in Table 1 with some modifications. First, the advance mailing should contain a letter and a brochure similar to what is provided in the current ATUS advance mailing. The letter would have to be altered in order to provide the designated person with a URL, and a user name and password or similar login procedure to use once they have reached the ATUS diary website. The exact protocols for delivering the login information provided may vary depending on the security requirements for BLS surveys. We also recommend including a $2 prepaid incentive in the advanced mailing as a token of appreciation for completing the survey. The purpose for the incentive is to encourage the designated person to complete the interview via the web, which should lead to cost savings versus completing the interview by telephone. It may also be helpful to provide materials that will help the respondent complete the diary. For example, a copy of the activity categories that the respondent will be using when filling out the web diary could be provided.

As shown in Table 1, a replacement letter would be sent to designated persons who did not complete the interview during the first week. This letter would contain much of the same information that is included in the current ATUS refusal conversion letter. It would also include the log-in information and URL that the respondent uses to complete the web diary.

After week one, the design in Table 1 differs depending on whether the household provided a telephone number during the CPS and the designated person's likelihood of using the web. First, the non-telephone households would have up to three weeks to complete the diary via the web. They would receive the advance mailing plus two replacement mailings if needed. The designated person would then be sent a letter with a $40 pre-paid debit card asking them to call-in to the telephone center if they have not completed the interview by week 3. In other words, contact procedures for the non-telephone households become very similar to the current ATUS contact procedures for this group after week three. The initial web alternative gives non-telephone households another viable option to complete the survey to increase response for this group.

The contact protocol for households with a telephone number varies depending on what is known about the designated person's likelihood of using the web from the CPS. Table 2 shows a summary of Internet use for households in 2013 by age of the householder, educational attainment of the householder, and household income. The table shows substantial drops in Internet use for households where the householder is 65 or older, the householder has a high school degree or less, and where the household income is less than $25,000.

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Table 2. Internet use by household characteristics – American Community Survey

Household characteristics	N	Percent with Internet subscription
Total households	116,291	74.4
Age of householder		
15-34	22,331	77.7
35-44	20,745	82.5
45-64	46,015	78.7
65 years or older	27,201	58.3
Educational attainment of householder		
Less than high school graduate	12,855	43.8
High school graduate (or equivalent)	28,277	62.9
Some college or associates degree	34,218	79.2
Bachelor's degree or higher	36,349	90.1
Household income		
Less than $25,000	27,605	48.4
$25,000-$49,999	27,805	69.0
$50,000-$99,999	34,644	84.9
$100,000-$149,999	14,750	92.7
$150,000 or more	11,487	94.9

Source. Computer and Internet Use in the United States: 2013 – American Community Survey Reports.

Based on the evidence in Table 2, we suggest making fewer contacts to households where the designated person is age 65 years or older, has less than a high school degree, or lives in a household with less than $25,000 in income. We call these designated persons our "low web use" group. These designated persons with a telephone number are switched to the telephone mode one week earlier than others with a telephone number. Although the data in Table 2 refer to the householder, we recommend using the actual age and education information for the designated person when making the assignment to these groups.

The proposed design in Table 1 assumes that the designated person's e-mail information is not available from the CPS as is currently the scenario. Collecting the designated person's e-mail address at the time of the CPS would make invitations and follow-ups easier and less costly. Hence, we would recommend collecting e-mail addresses in the CPS if possible. Even with e-mail addresses available, we would still recommend an advance mailing that provides the respondent with the initial request and information about the survey. Initial contacts by e-mail have the potential to be deleted by e-mail filters or missed by the designated person. However, e-mail follow-up reminders and follow-ups have two major advantages. First, there is less lag time between when the information is sent and when the respondent receives the information. Second, direct links or log in information for the web diary can be provided in the e-mail making it easier to open the diary. In addition, e-mail follow-ups would be cheaper relative to any telephone follow-ups.

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ATUS Diary Design for Web Collection 4

Survey Questions and Overall Diary Design

Much of the general structure of the time diary from the current ATUS interview can be maintained in the move to a web diary. Figure 1 illustrates a potential layout for collecting time diary information. There are several features of the design that should enhance collection of time diary information and minimize differences with the current ATUS design. First, the existing survey questions for the time diary can be used with minimal changes. Figure 1 illustrates that the first question a respondent would see on the screen once they entered the time diary is "Please select or enter a description of your main activity on [DAY], [DATE] at [TIME]." This first question focuses the respondent on their designated diary day. It is possible to collect paradata that indicates when the respondent entered the diary information. It may also be important to confirm the respondent answered about their designated diary day with a debriefing question at the end of the survey. The time should be updated automatically as the respondent enters activities throughout the day.

Figure 1.   Example ATUS time diary

The respondent could click a link to see a list of the full ATUS activity classification to help them determine how to best classify an activity. In addition to using the dropdown list, we recommend that the respondents have the opportunity to search for activities that they cannot find in the dropdown lists. If the search is not successful, the activity can be recorded verbatim. These activities could be coded using similar procedures for coding activities in the CATI diary. The object of the search capability is to limit the amount of open ended comments that are necessary to code.

The web instrument would use progressive disclosure of the dropdown lists and follow-up questions. For example, second tier (e.g., working at main job) categories would only appear after the respondent had selected a first tier activity (e.g., work). Third tier categories could also be utilized where more detail is needed. Likewise, the follow-up questions "How long did you spend on this activity?", "Who was with you during this activity?", and "Where were you during this activity?" would only appear after the activity was selected. This is useful since the follow-up questions are dependent on selection of the activity. For example, the "who" and "where" follow-ups are not asked when the respondent selects sleeping or some other personal care activities.

Respondents would have the choice of entering the time that they stopped the activity or how long they spent on the activity, which is consistent with the current ATUS interview where the interviewer can do either. The "Who" list would be populated from the household roster that was asked earlier in the interview and also include important pre-coded persons who would not be part of the roster and are part of the current ATUS "Who" list. The "Where" dropdown list could match the existing list on the ATUS. A list of transportation modes would be displayed if the respondent selects transportation as an activity.

One final important feature of the time diary is a table that summarizes the respondent's time use as it is entered throughout the day. This table provides a memory cue and context to the respondent as they think about the next activity that they did during the diary day. This table would also provide a logical place for the respondent to edit or add activities that they think about as they are filling out the diary, but did not remember when they were first entering information in the diary.

Summary of Diary Day

At the end of the interview the respondent should be given the opportunity to review the activities they reported for the entire day. Figure 2 gives an example of how this screen may appear. This screen allows the respondent to see their day as a whole and is a logical place for the respondent to

make any edits to their day. We could include as much information on this screen as necessary. For example, we could include columns that display "Who" and "Where" information related to each activity. The respondent may feel the need to edit after reviewing their day in its entirety. They may also edit in response to pre-programmed quality checks for the respondent to edit the screen. For example, the respondent might not have reported any eating and drinking during the day and the instrument could probe the respondent about this scenario.

Figure 2.   Summary of diary day

Other Summary Questions

There are four sections of the ATUS interview that involve a summary of activity that may have already been reported in the diary. These sections include work and income-generating activities, secondary childcare, volunteering, and eldercare. We expect that by this time in the interview the respondent has finalized their activity for the day so that it would not be necessary to return to the diary to edit information. We now outline a strategy for collecting this information through a series

of summary screens once the respondent has completed the diary. It may not be necessary to include some summary screens (e.g. work and volunteer activity) since respondents are self-reporting activity in the diary; however, for the purposes of the mock-up exercise it may be worthwhile to see examples of how these screens might work in practice.

Work and income-generating activities. The current ATUS interview asks the following:

> "We are interested in measuring the amount of time people spend working both inside and outside their usual workplace. You said that you were working from [start and stop time of worked at main job from time diary]. Were there any [other] activities that were done as part of your job or business? Please do not include getting ready for work or commuting.

Respondents are then asked to report whether these activities were done for their main job or for their "other" job. Finally, respondents are asked to report about other income-generating activities that were not part of their job such as "selling crafts or babysitting." Figure 3 illustrates how summary screens on the web might be used to collect this information. The respondent would be presented with the activities that they reported during the day. The table could highlight activity that has already been reported as work. The respondent would then be asked to indicate if there were any other activities that they were paid for as part of their job or another paid activity.

Figure 3.   Summary screens for work and income-generating activities

Secondary childcare. The current ATUS interview first asks respondents about the times in the day when children in the household are awake. Then respondents are asked "At which times during that time period, was [CHILD] in your care?" The secondary childcare section asks this information about three different classes of children: own household children, own non-household children, and non-household children. Figure 4 gives an example of how the childcare summary screen can be designed. The respondent can indicate in the final column of the table whether the child was in their care during the day. It would also be possible to add a checkbox that allows the respondent to indicate the child was in their care for the entire day. Additional columns can be added to the table for additional children including own non-household children. A separate screen may be needed to collect this information about non-household children that are not part of the roster.

Figure 4.   Summary screen for secondary childcare

Volunteering. The volunteering summary screen will be relatively straightforward. The current ATUS interview essentially asks if the respondent did "any volunteer activities for or through an organization." The respondents could be presented with their reported activities and asked to indicate which activities were done as part of volunteering.

Eldercare. Most of the eldercare questions are asked more generally about the respondent's provision of care to elderly persons. However, the end of the section asks did the respondent "provide any care or assistance yesterday?" and then "At which times or during which activities did

you provide that care or assistance yesterday?" Once again, for those who report providing elder care, we could present a table that summarizes their activities during the day and have them indicate during which activities they were providing care.

Probes

The ATUS interviewers have a number of follow-up probes in the diary that are used to gather more information on specific topics and responses. One type of follow-up probe is automated; with this probe, a pop-up screen in the CATI instrument displays the probe question text. Any activity that lasts more than 2 hours, with the exception of sleeping, working, or attending high school, requires the interviewer to verify the activity by asking the question: Did you stop (activity) to do anything else at that time? Work activities that last more than 4 hours generate an instrument pop-up requiring the interviewer to ask the respondent if he/she took any breaks of 15 minutes or longer. If a respondent reports sleeping more than 10 hours, the interviewer must verify the duration of the sleep activity. Another automated probe is for respondents who do not report any eating or drinking activities in the diary. Interviewers must verify that the respondent did not eat or drink as a main activity on the diary day. There are a number of other probes that do not automatically pop up, but which interviewers must still ask to collect the level of detail required for activity coding. Although we may be able to prevent some mistakes with some instructions at the beginning of the instrument, we anticipate that some quality checks and probing will be needed in the web instrument.

There are two locations where probes could be utilized. First, the probes could be inserted in the web diary as respondents are entering their activities throughout the day. The advantage of this is that it trains the respondent to adhere to the best procedures for entering their activity. For example, it would be logical to include probes about missing travel activity when the location changes between activities. This provides information to the respondent that this level of detail is important in the diary and may help to prevent similar errors. However, it may be best to include minimal probing at this point of the interview since the respondent could become frustrated by multiple prompts for corrections or additional information. This may increase the likelihood of a break-off. Another logical place for probes is at the end of the interview on the "Activity Summary Screen" after the respondent has had the opportunity to report all activities for the diary day. The advantage of this location is that the probes do not interrupt the flow of the instrument for the respondent. Some probes are only applicable to this type of screen. For example, a probe about excluding eating or drinking can only be asked in the context of the entire day. The disadvantage of including too many probes at the end of the interview is that the respondent may not have learned the correct

behavior while completing the diary that leads to numerous prompts at the end of the interview for correction. The exact placement of the probes should be guided by the importance of the probe, whether the probe refers to the entire diary day, and how burdensome or frequent the probes might occur and interrupt the flow of the interview.

Changes to Activity Classification

One challenging aspect of moving to web data collection is the selection of activities by respondents. In the current ATUS interview, the respondent reports their activity verbatim and the interviewer either uses a pre-coded category or records the response verbatim and the activity is coded later. The role of the interviewer is helpful in this context, because they are familiar with the coding scheme.

There are different ways for respondents to select activities. One way is to have the respondent type in the activity verbatim. This allows the respondent to describe the event in their own words, but is the most burdensome. The task of typing is burdensome alone and verbatim recording also does not provide the respondent much of a cue about the level of detail that the ATUS is most interested with. Therefore, we do not recommend using verbatim recording of activities. Another way that helps to minimize burden is to have the respondent select a pre-defined activity from a set of dropdown boxes. Although this minimizes burden, the activity classification will need to be useable enough for the respondent to easily find the most relevant category. In addition, these categories will be a subset of all activity categories that may not provide the needed level of detail for ATUS. For example, if a respondent reports reading, it might be necessary to follow-up with more specific categories.

We create a revised activity classification by first examining the existing precodes used by interviewers in the ATUS. These precodes correspond to activities that have only possible activity code in the ATUS activity lexicon. Next, we analyzed the 2013 ATUS activity file to determine which activities were most frequently reported. Table 3 shows the percentage of activities in each of the tier 1 codes. The table lists the activities by how frequently they are reported. The "precodes" column of the table shows how the precoded categories align with the tier 1 codes. The table shows that almost 90 percent of the reported activities fall in the first seven categories. Hence, we focused extensively on the types of activities that are located in these categories to make sure that respondents could easily recognize and select the more frequent categories. Similar analyses at the tier 2 and tier 3 level were helpful for this purpose (See Appendix D and Appendix E).

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The results of these analyses suggest a few changes to the activity classification. First, prevalent categories such as sleeping, grooming, and watching television should be readily available at the main activity level. Second, some categories at the second level may need to be moved within other main activities in order to make them easier to locate for respondents. For example, "Food and Drink Preparation" is found under "Household Activities" in the current ATUS activity classification. It may be easier for respondents to find under "Eating and Drinking" when selecting the option on their own.

Table 3.   Distribution of ATUS tier 1 activity codes

Tier 1 Code	Description	Precodes	Percent	Cummul.per.
18	Traveling		19.47	19.47
1	Personal care	Sleeping, Grooming	19.05	38.52
12	Socializing, Relaxing, and Lesiure	Watching TV	16.21	54.73
2	Household activities	Preparing meals or snacks, Laundry	14.38	69.11
11	Eating and drinking	Eating and drinking, Cleaning kitchen	10.42	79.53
3	Caring for and helping HH members		5.26	84.79
5	Work & work related activities	Working at main job, Working at other job	4.47	89.26
7	Consumer purchases	Grocery shopping,	3.39	92.65
50	Data codes		1.28	93.93
13	Sports, exercise, and recreation		1.27	95.2
4	Caring for and helping non HH members		1.16	96.36
16	Telephone calls		0.99	97.35
14	Religious and spiritual activities	Attending religious services	0.91	98.26
15	Volunteer activities		0.59	98.85
6	Education		0.56	99.41
8	Professional and personal care services	Paying household bills	0.46	99.87
9	Household services		0.11	99.98
10	Government services & civic obligations		0.03	100

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Third, travel is listed as a main activity. The Canadian experience demonstrates that travel is often forgotten if it is not an explicit category. Finally, we include options for "Other" if the respondent cannot find their activity but they want to report verbatim and "Don't know/Can't remember" if they cannot find their activity or do not want to report. The suggested revision of the ATUS classification is shown in Appendix F. As with all major revisions such as this, it will be important to test the revised activity classification to determine its effectiveness.

In addition to analyzing the data, it would be helpful to review the literature involving ATUS data to determine which activity categories are of analytic interest. Infrequently reported activities might be of particular analytic interest and still worth retaining in the activity classification.

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Discussion 5

As with any major design change, such as changing modes, it will be important to evaluate different features of the new design to both determine any differences with the existing design and to guide the development of a more optimal design. We highlight a few areas that will need to be tested.

Contact Procedures: We have proposed a sequence of contacts that is consistent with other projects that have attempted mixed-mode designs involving web data collection. However, we have tailored the procedures in the context of the time use survey. For example, the timing of the invitation and follow-ups is structured around the diary day. Experiments testing different sequences and modes of contact would provide valuable information about the optimal timing, number, and type of contacts. We have also proposed slightly different contact procedures for designated persons with a high likelihood of web use versus those with a low likelihood of web use. Experiments would lend much insight into whether the different contact procedures are helpful. It will also be worthwhile to test the feasibility of different secure log-in procedures for the sample persons to access the website.

Diary Design: There are many aspects of the diary design that need extensive testing and development. First, the activity classification will be important for respondents to help them understand the level of detail that is necessary for time use and to help them find the activities that they participated in during the day. Cognitive testing or card sorting activities would provide a great deal of information about the adequacy of the classification scheme.

Another area in need of testing will be the placement and implementation of probes. There will be a trade-off between having the probes occur in the diary where they may be most relevant or on the summary screen where they might provide the lowest level of burden throughout the interview. Related to this feature is the implementation of how respondents can edit diary entries in a straightforward way when mistakes are identified. Usability testing and field experiments will provide the best evidence for placement of probes and implementation of editing procedures.

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We have also placed the summary questions after diary entry similar to the current ATUS interview. It may make sense to place some of these follow-ups in the diary section. For example, it might be possible to ask extra questions during the diary after select activities such as, "Was this activity done as part of your job or did you get paid to do this activity?" This would facilitate asking about income-generating activities while the respondent is concentrating on a specific activity and may eliminate the need for a summary screen. Once again, the potential improvement in measurement would have to be balanced against the amount of burden that the extra questions in the diary place on the respondent.

Another area that may need some testing is the respondents reaction to dependent data being displayed in the survey interview. For example, data could be inserted into the web instrument from the CPS regarding the respondents household or employment status. Cognitive testing or debriefing could help to understand how respondents react to seeing this type of information.

Many of these topics will be addressed more thoroughly in the data comparability report to follow.

Scope of the Mock-up Task 6

Next, Westat will create a web diary mock-up based on the design summarized in this document. As mentioned earlier, the ATUS interview includes a number of sections collecting different types of information. The interview includes questions about (1) the composition of the household, (2) the respondent's labor force and school enrollment status (3) the 24-hour time diary about "yesterday" and (4) summary questions about specific topics of interest.

The mock-up will focus specifically on the last two components of the interview regarding the design of the web diary and summary screens that follow. These sections of the interview collect the most critical information for the ATUS and present the biggest challenges for moving the interview to the web. In contrast, we believe that the first two components of the interview about household composition and labor force status are relatively straightforward in terms of instrument design. Hence, they are not included in the mock-up task. However, there might be elements of the diary that interact with other parts of the interview and these will be noted in the mock-up task.

The purpose of the mock-up will be to demonstrate some important aspects of the designed diary outlined in this task rather than providing a completely functional diary. In addition, the mock-up will focus primarily on the design of a diary intended for administration on a laptop or desktop, because we believe some features such as populating a summary table, may be difficult on smartphones given the small screen size of the these devices. However, where possible, the mock-up process will reveal potential changes that could be made in order to accommodate the smaller devices.

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Bonke, J., & Fallesen, P. (2010). The impact of incentives and interview methods on response quantity and quality in diary-and booklet-based surveys. In Survey Research Methods, 4 (2), 91-101.

Medway, R. L., & Fulton, J. (2012). When more gets you less: A meta-analysis of the effect of concurrent web options on mail survey response rates. *Public Opinion Quarterly*, 76(4), 733-746. Retrieved from http://poq.oxfordjournals.org/content/76/4/733.full.pdf+html.

Millar, M. M., and Dillman, D. A. (2011). Improving response to Web and mixed-mode surveys Internet using address-based sampling and mail contact procedures. *Public Opinion Quarterly, 75*, 249-269.
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Part III
Comparability Report

Comparability Report

Introduction

The Bureau of Labor Statistics (BLS) is interested in adding a self-administered, web-based reporting mode to the American Time Use Survey (ATUS) as part of a sequential mixed-mode design. Implementing web data collection would constitute a major change in data collection procedures for the ATUS that may impact the comparability of data from previous years with data collected with the new design. In addition, the mixed-mode design could create discrepancies between data collected over the web and data collected over the phone within the same year. This report identifies some potential comparability issues along with research designs that could be used to study them.

Review of Proposed Mixed-Mode Design

Table 1 illustrates the proposed mixed-mode design from the ATUS web design task. This design varies depending on the week that the case is in the sample, whether or not a telephone number is available for the household, and the likelihood of the designated person being a web user. The diary day in Table 1 refers to the actual day that the respondent reports about for the time diary.

Table 1. Contact procedures for mixed-mode design

| Week | Day | Telephone HH | | Non-telephone HH |
		High web use	Low web use	
1	7 days before diary day 1 day after diary day	Advance mailing Replacement letter	Advance mailing Replacement letter	Advance mailing Replacement letter
2	1 day after diary day	Replacement letter	Switch to phone for remaining weeks; calls begin on the day after the diary day on week three	Replacement letter
3	1 day after diary day	Switch to phone for remaining weeks; calls begin on the day after the diary day on week four	Call for interview	Switch to phone for remaining weeks; Send letter with pre-paid incentive card and call-in number
4-8	1 day after diary day	Interviewer calls for interview on day after diary day	Interviewer calls for interview on day after diary day	Respondent calls in for interview on day after diary day

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The proposed design includes the following features.

1. An advance mailing containing a letter and brochure describing the purpose of the ATUS. The letter would have to be altered in order to provide the designated person with a URL, and a user name and password or similar login procedure to use once they have reached the ATUS diary website. It may also be helpful to provide materials that will help the respondent complete the diary (e.g., the complete activity classification

2. We also recommend including a $2 prepaid incentive in the advanced mailing as a token of appreciation for completing the survey. The purpose for the incentive is to encourage the designated person to complete the interview via the web, which would lead to cost savings versus completing the interview by telephone. Nonmonetary incentives such as a pen, magnet, or informational brochure could also be considered if cash incentives are not feasible; however, the literature suggests that nonmonetary incentives are not as effective as monetary incentives (Ryu, Couper, and Marans, 2005; Singer et al., 1999, and Church, 1993).

3. A replacement letter would be sent to designated persons who did not complete the interview during the first week.

4. Designated persons who do not complete the survey by web are eventually switched to telephone data collection depending on their likelihood of using the web and provision of a telephone number during the CPS.

Evaluation of Proposed Design

It is helpful to use a total survey error perspective when evaluating potential differences between survey designs using different modes of data collection. Tourangeau, Conrad, and Couper (2013) describe how mode can affect both errors of non-observation and errors of observation. Coverage, nonresponse, and measurement error can all be affected by the choice of mode. A survey estimate such as a mean consists of three components. The mode effect is simply the net effect of the differences in errors across modes.

Survey mean = average of true values + mode effect + average of random errors (1)

Errors of non-observation consist of coverage errors due to some members of the population who are excluded from participating with a mode (e.g., no web or telephone access) and nonresponse errors due to those who do not respond to the survey request. Coverage errors depend on the size of the excluded group and the size of the difference between those that are covered and those that

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are not covered. Nonresponse errors depend on the size of the correlation between the likelihood of responding in a mode and the survey variables.

Errors of observation include measurement errors, which are the difference between the survey responses and the true values for the respondents. In a mixed-mode design the measurement errors are a weighted average of the systematic errors in each mode.

The ideal research design for assessing mode effects will assess both errors of non-observation and observation. Table 2 presents a research design that can estimate the effect of the proposed research design in comparison to the current ATUS design. The proposed mixed-mode design is shown in columns 3-5 of the table and the current ATUS design is shown in columns 6-8. The current ATUS design has a slight modification that enables a random subsample of the interviewers to use the web instrument when administering the interview to evaluate whether using a single instrument is feasible. Additional training will be needed the interviewers who are administering the web instrument. For example, the web instrument would not include analogous instructions and question wordings that the interviewers use in the traditional CATI instrument. It is possible that the web instrument might need to be modified slightly to assist the interviewer with administering the web instrument.

The overall response rate from the mixed-mode design can be compared to the overall response rate from the CATI-only design that resembles the current ATUS design to understand the effect of the mixed-mode design on nonresponse. Relatively little is known about how response rates for web surveys compare specifically with telephone surveys. A meta-analysis by Lozar Manfreda (2008) included only five telephone studies, but found that response rates for web surveys are about 12 percentage points lower than their telephone counterparts. The unique design of the ATUS using the CPS sampling frame makes it difficult to compare with other surveys.

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Table 2.   Experimental design

| Week | Day | Proposed Mixed-mode Design | | | CATI-only | | |
| | | Telephone HH | | | Telephone HH | | |
		High web use	Low web use	Non-telephone HH	CATI instrument	Web instrument	Non-telephone HH
1	7 days before diary day / 1 day after diary day	Advance mailing / Replacement letter	Advance mailing / Replacement letter	Advance mailing / Replacement letter	Advance mailing / Interview calls for interview on day after diary day	Advance mailing / Interview calls for interview on day after diary day	Advance mailing / Respondent calls in for interview on day after diary day
2	1 day after diary day	Replacement letter	Switch to phone for remaining weeks; calls begin on the day after the diary day on week three	Replacement letter	Interview calls for interview on day after diary day	Interview calls for interview on day after diary day	Respondent calls in for interview on day after diary day
3	1 day after diary day	Switch to phone for remaining weeks; calls begin on the day after the diary day on week four	Interview calls for interview on day after diary day	Switch to phone for remaining weeks; Send letter with pre-paid calling card and call-in number	Interview calls for interview on day after diary day	Interview calls for interview on day after diary day	Respondent calls in for interview on day after diary day
4-8	1 day after diary day	Interviewer calls for interview on day after diary day	Interviewer calls for interview on day after diary day	Respondent calls in for interview on day after diary day	Interview calls for interview on day after diary day	Interview calls for interview on day after diary day	Respondent calls in for interview on day after diary day

We would expect the mixed-mode design would achieve higher response rates than the use of a single telephone mode; however, some studies have found evidence for a suppression effect that occurs when sample members refuse an initial mode such as web. For example, at least two studies show that starting with mail and switching to web leads to higher response rates than beginning with web and switching to mail (Messer and Dillman, 2011; Smyth, Dillman, Christian, and O'Neill, 2010). This suggests that the mail mode is the higher propensity mode and that once someone has refused a mode such as web in a web/mail sequential mixed-mode design they are less likely to respond by mail than if mail would have been offered first. The mode literature on sequencing of modes is changing developing quickly and at least one other study by Olson, Smyth, and Wood (2012) did not find this suppression effect. Furthermore, Millar and Dillman (2011) found in a study of students that starting with web first can have an advantage when e-mail invitations are used to contact sample members. Unfortunately, we are not aware of any relevant comparisons for web and telephone that provide insight about the sequencing of web and telephone modes. Hence, the design will be informative for understanding any response rate differences between the new mixed-mode design and the current ATUS design. The design will also enable a comparison of web to telephone response rates up until the point of the mode switch in the mixed-mode design.

Measurement error can also be evaluated by comparing estimates of time use between web and telephone respondents up until the point of the mode switch. One potential complication with this comparison is that any differences due to coverage and nonresponse between the modes will make it difficult to draw conclusions about differences in measurement error. Fortunately, differences in nonresponse and coverage across designs can be modeled using covariates from the rich CPS sampling frame (Vannieuwenhuyze and Loosveldt, 2010). It would then be possible to use the inverse of the response probabilities to reweight the data before conducting analyses. The assumption behind this technique is that the respondents in the modes are statistically equivalent conditioned on the covariates from the CPS sampling frame. This assumption would be questionable under many survey designs, but the rich set of variables available on the CPS frame makes the assumption more appropriate for the ATUS data.

As was discussed in the literature review and design proposal, there may be several sources of measurement differences across modes. Some differences might point to the web having better measurement properties and others may suggest the telephone is better. At least two factors indicate the web has better measurement properties. First, the ATUS has been shown to have some degree of error associated with recall (Al Bagahl et al., 2014). The diary can be completed on the web in near real-time so that recall error is minimized. Another possibility is that the self-administered web mode might lead to less socially desirable reporting. For example, respondents might be willing to

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report more TV watching. Other factors indicate that the telephone might produce better data quality. First, in the CATI implementation of the ATUS interview, the respondent is able to discuss conversationally with the interviewer about their activities during the day. The interviewer may be able to more accurately record the activities that the respondent reports than would be captured by a categorized self-report. Second, the interviewer might be able to probe for inconsistencies better than a web instrument, leading to better data quality. Finally, the telephone mode might lead to more complete data since the interviewer can also probe the respondent to provided missing data. Hence, an analysis of item nonresponse would also be important in comparing web and telephone data collection.

Additional Experimental Factors

There are some additional experimental factors that might be considered based on the materials that have been completed for this project and discussions between BLS and Westat. Some of these experimental factors would involve substantial changes in the contact information available for the ATUS.

First, a challenge with the ATUS design is the need for the respondent to complete the web diary on a specific day. One design factor that could influence the likelihood of this occurring as planned is a reminder on or about the day before the respondent sample member is to complete the web diary. Hence one might consider either a reminder telephone or IVR call the day before the web diary is to be completed. This call also provides the opportunity to give the respondent instructions about the web diary if needed. The potential downside of this call is that it provides an opportunity for the respondent to refuse and it also increases the cost of the mixed-mode design.

Second, there is evidence that e-mail augmentation of web requests increases the likelihood of response via the web (Millar and Dillman, 2011). For example, the design could be altered by sending e-mails with web links at the same time as advance mailings to increase response by the web. This design feature would require e-mail addresses (preferably for all household members) to be collected at the time of the CPS. It may also be possible to ask respondents to provide an e-mail address in response to the advance mailing.

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Adjustments for Mode Effects

There are different approaches that can be used to adjust the data for mode effects (Kolenikov and Kennedy, 2014; Vannieuwenhuyze and Loosveldt, 2010; Elliot et al., 2009). However, there are very few examples of studies where an adjustment is made for mode effects. This is probably because it can be difficult in many situations to determine whether the adjustment procedure produces better estimates than the unadjusted estimates. Kolenikov and Kennedy (2014) discuss some different approaches to adjusting estimates for mode effects. They found that 19 out of 297 variables examined showed significant differences between the CATI and web groups. One set of approaches they used for adjustment of the estimates used regression techniques. The regression adjustment involved regressing the survey responses on an indicator for mode and additional covariates. The procedure then adjusts the aggregate estimate for one mode by subtracting the estimated mode effect. Another set of approaches involved treating the responses to one mode as missing and imputing the values based on a model. They tried two different imputation models. They found that the regression and imputation approaches generally produced similar results in terms of adjustments to the point estimates. Each produced a roughly four to six percent change in the estimates such that the adjusted estimates were in the direction of less social desirability. It is reassuring that the fairly simple regression method produces similar estimates to the relatively more computationally complex imputation based estimates. However, Kolenikov and Kennedy argue that the larger standard errors computed by the imputation methods more accurately reflect the uncertainty of the adjustment.

Diary Design

There are many aspects of the diary design that will need to be tested before they are implemented in the field. We suggest that much of this work be done in a laboratory setting using techniques such as cognitive testing and usability testing.

First, the activity classification will be important for respondents to help them understand the level of detail that is necessary for ATUS and to help them find the activities that they participated in during the day. Westat proposed a revision to the ATUS activity classification in the web design task. The revision was developed by examining the frequency of different activities and making the more frequent activities easier to find in the classification by sometimes making them a single category. Some activities such as food and drink preparation were moved from being under household

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activities to eating and drinking to form a more logical grouping for an untrained respondent. Cognitive testing or card sorting activities would provide a great deal of information about the adequacy of the classification scheme. In addition, usability testing would also be helpful. For example, observing respondents answering questions about their activities may reveal how much detail is necessary for respondents to accurately report their activities. This would be informative for determining how many levels of activity classification would be needed in any drop-down menus. We also believe that a search capability should be developed for cases where the respondent cannot find a suitable activity category. Usability testing would provide the best insights into how the search is being used and whether the search is preferable to drop-down menus.

The placement of probes in the web instrument should also be addressed with usability testing. As discussed in the design proposal, there will be a trade-off between having the probes occur during the diary where they may be most relevant or on the summary screen where they might provide the lowest level of burden throughout the interview. Usability testing would provide an understanding of the respondents' experience with probes in the instrument. Related to this feature is the implementation of how respondents can edit diary entries in a straightforward way when mistakes are identified. The ability to edit may become very complex and will have to be carefully planned and tested. For example, changing or adding an existing entry in the web diary might create conflicts with other entries. Usability testing will provide evidence about how respondents might prefer to edit diary entries.

BLS staff may also conduct usability testing to explore the best place to include summary questions. The ATUS uses summary questions after the time diary to collect more detailed information about times when the respondent was working or volunteering. It may make sense to place follow-ups related to income-generating activity directly in the diary section. For example, it might be possible to ask extra questions during the diary after select activities such as, "Was this activity done as part of your job or did you get paid to do this activity?" This would facilitate asking about income-generating activities while the respondent is concentrating on a specific activity and may eliminate the need for a summary screen. The main drawback of this approach is that it adds burden to the initial data entry task. Usability testing would provide evidence about how this placement affects the user's experience.

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References

Al Baghal, T., Belli, R.F., Phillips, L.A., and Butler, N.R. (2014). What are you doing now? Activity-Level Responses and Recall Failures in the American Time Use Survey. *Journal of Survey Statistics and Methodology*, 4, 519-537.

Church, A.H. (1993). Estimating the effect of incentives on mail survey response rates: A meta-analysis. *Public Opinion Quarterly*, 57, 62-79.

Elliott, M. N., A. M. Zaslavsky, E. Goldstein, W. Lehrman, K. Hambarsoomians, M. K. Beckett, and L. Giordano (2009). Effects of survey mode, patient mix, and nonresponse on CAHPS® Hospital Survey scores. *Health Services Research*, *44*, 501–518.

Kolenikov, S., and Kennedy, C. (2014). Evaluating three approaches to statistically adjust for mode effects. *Journal of Survey Statistics and Methodology*, *2*, 126-158.

Lozar Manfreda, K., Bosnjak, M., Berzelak, J., Haas, I., and Vehovar, V. (2008). Web surveys versus other survey modes: A meta-analysis comparing response rates. *International Journal of Market Research*, *50*, 79-104.

Messer, B. L., and Dillman, D. A. (2011). Surveying the general public over the Internet using address-based sampling and mail contact procedures. *Public Opinion Quarterly, 75*, 429-457.

Messer, B. L., and Dillman, D. A. (2011). Surveying the general public over the Internet using address-based sampling and mail contact procedures. *Public Opinion Quarterly, 75*, 429-457.

Millar, M. M., and Dillman, D. A. (2011). Improving response to Web and mixed-mode surveys Internet using address-based sampling and mail contact procedures. *Public Opinion Quarterly, 75*, 249-269.

Olson, K., Smyth, J. D., and Wood, H. M. (2012). Does giving people their preferred survey mode actually increase participation rates? *Public Opinion Quarterly, 76*, 611-635.

Ryu, E., Couper, M.P., and Marans, R.W. (2015). Survey incentives: cash vs. in-kind; face-to-face vs. mail; response rate vs. nonresponse error. *International Journal of Public Opinion Research*, 18, 89-106.

Singer, E., Van Hoewyk, J., Gebler, N., Raghunathan, T., & McGonagle, K. (1999). The effect of incentives in telephone and face-to-face surveys. *Public Opinion Quarterly*, 64, 171-188.

Smyth, J. D., Dillman, D. A., Christian, L. M., and O'Neill, A. C. (2010). Using the Internet to survey small towns and communities: Limitations and possibilities in the early 21st century. *American Behavioral Scientist*, *53*, 1423-1448.

Vannieuwenhuyze, J. T. A., Loosveldt, G., and Molenberghs, G. (2010). A method for evaluating mode effects in mixed-mode surveys. *Public Opinion Quarterly*, *74*, 1027-1045.

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Part IV

Final Mock-Up

Synthesis and Final Mock-up

This report discussed the potential and challenges with implementing a mixed-mode design involving web data collection for the ATUS. We briefly synthesize the findings from the report and introduce the final mock-up design that was created at the end of the project.

Synthesis

This literature review was undertaken to inform the design of a web instrument that could be used in a mixed-mode design in the ATUS. We briefly reviewed the current features of the ATUS relevant for the design. We also reviewed the literature illustrating potential sources for error related to coverage, nonresponse, and measurement error for a web instrument in a mixed-mode design for the ATUS. Finally, we reviewed several surveys that are using web instruments to measure time use.

The literature suggests that including web in a mixed-mode design is feasible. Other countries have implemented a similar approach (e.g., Bonke and Fallesen, 2012); however, nearly all of the studies we reviewed were pilot studies that have not been implemented in a production environment. Hence, time use studies using the web relatively rare. The current literature offers some guidance about how self-administered data collection may relate to the current telephone administered design, but there are many areas that need further research. Further research is needed to understand if a light diary approach with a more general activity classification produces similar results to a full diary such as ATUS. More genereally, additional methodological research is needed to understand the best strategies for pushing sample members to complete surveys on the web.

Beginning with the literature review and the current design of the ATUS we developed a suggested web design for moving the ATUS to a mixed-mode design including web data collection. In this web design task, we proposed a design includes the following features.

1.	An advance mailing containing a letter and brochure describing the purpose of the ATUS. The letter would have to be altered in order to provide the designated person with a URL, and a user name and password or similar login procedure to use once they have reached the ATUS diary website. It may also be helpful to provide materials that will help the respondent complete the diary (e.g., the complete activity classification

2. We also recommend including a $2 prepaid incentive in the advanced mailing as a token of appreciation for completing the survey. The purpose for the incentive is to encourage the designated person to complete the interview via the web, which would lead to cost savings versus completing the interview by telephone.

3. A replacement letter would be sent to designated persons who did not complete the interview during the first week.

4. Designated persons who do not complete the survey by web are eventually switched to telephone data collection depending on their likelihood of using the web and provision of a telephone number during the CPS.

There are a variety of different aspects of this design that would need to be evaluated. Errors of nonobservation (e.g. coverage and nonresponse error) and errors of observation (e.g. measurement error) would need to be evaluated in the design. The proposed experiments in Part III of this report facilitate the evaluation of these different error sources. The experiment compares a mixed-mode design with the current ATUS design. The results of the experiment will be informative for understanding differences in response through a comparison of overall response rates by condition. Response rates up until the point of a mode switch will provide the clearest indication of differences in response by mode. Measurement error such as differences in socially desirable reporting or item nonresponse can also be evaluated by the design. The design also evaluates the potentional for interviewers to use the web instrument for data collection over the phone.

We also discussed additional experimental factors to consider such as alternative contact procedures and e-mail augmentation of contact attempts. Calling the sample member on the day before they are to complete their web diary could increase the likelihood of completing the web diary at the specified time. The potential downside of this call is that it provides an opportunity for the respondent to refuse and it also increases the cost of the mixed-mode design. Second, there is evidence that e-mail augmentation of web requests increases the likelihood of response via the web (Millar and Dillman, 2011). The design could be altered by sending e-mails with web links at the same time as advance mailings to increase response by the web. This design feature would require e-mail addresses (preferably for all household members) to be collected at the time of the CPS or it may also be possible to ask respondents to provide an e-mail address in response to the advance mailing.

There will be additional factors related to the web design of the diary that will need to be evaluated. One primary feature is the modification of the activity classification scheme for self administered use on the web. Cognitive testing and card sorting activities will be helpful to understand how

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respondents thinking about time use on their own. Their will be many aspects of the diary that will help frame the task for respondents that will need to be testing including question wording and other detailed features such as the minimum amount of time that the respondent is able to report about. These all give cues to the respondents about the nature of the task and the level of detail in their response. Other important features such as the placement of probes and summary questions will be important for the new ATUS web design. Usability testing will be particularly informative about these features.

Mock-up

The final task in this project was to create a mock-up of a potential web instrument for the ATUS. The final mock-up is available at http://atus.wesdemo.com/. We will briefly review some of the key features of the mock-up. The home page for the mock-up is shown below in figure 1.

Figure 1.   Home page for ATUS mock-up
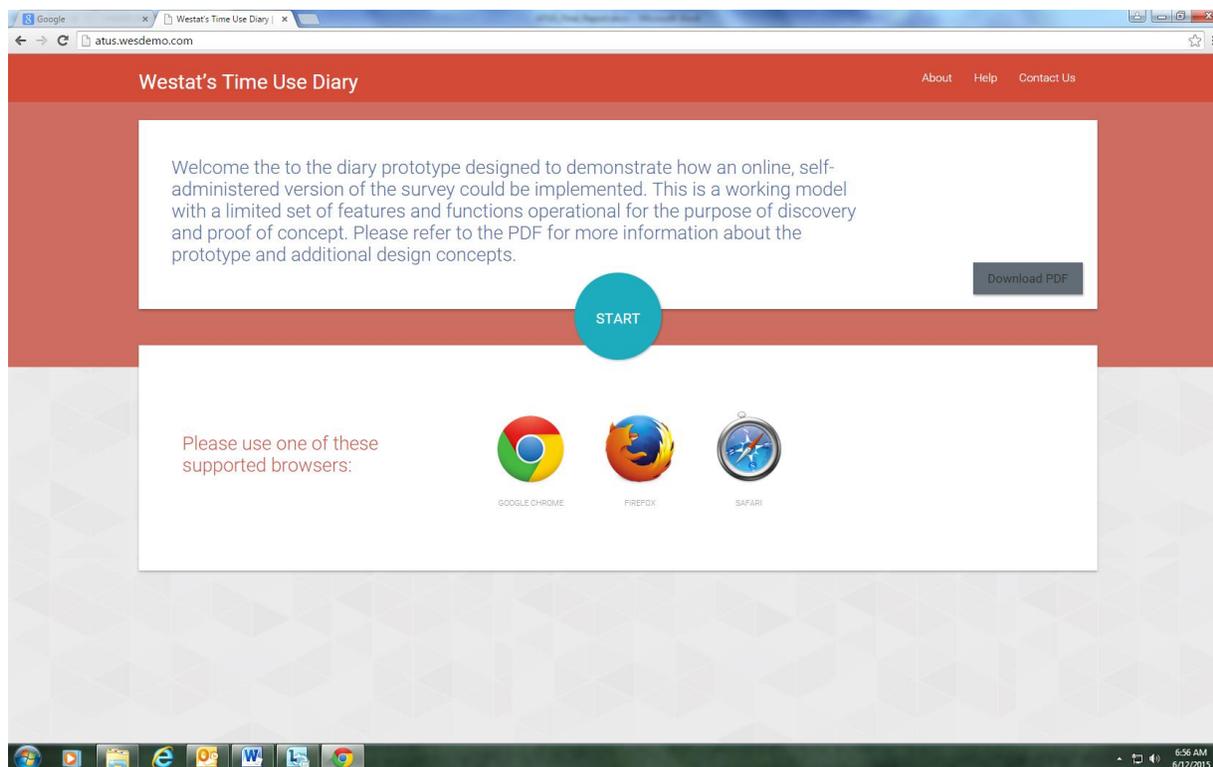
The link to the PDF provides some brief instructions about how to use the mock-up and describes some of the limitations. For example, features that are not fully functional in the mock-up are described in the document. Pressing "Start" will begin the mock-up.

Once you begin the mock-up an overlay is shown on the screen to provide the respondent with contextual help (see figure 2). For example, respondents can be told "If you cannot find your activity select the closest match."

Figure 2.   Contextual overlay
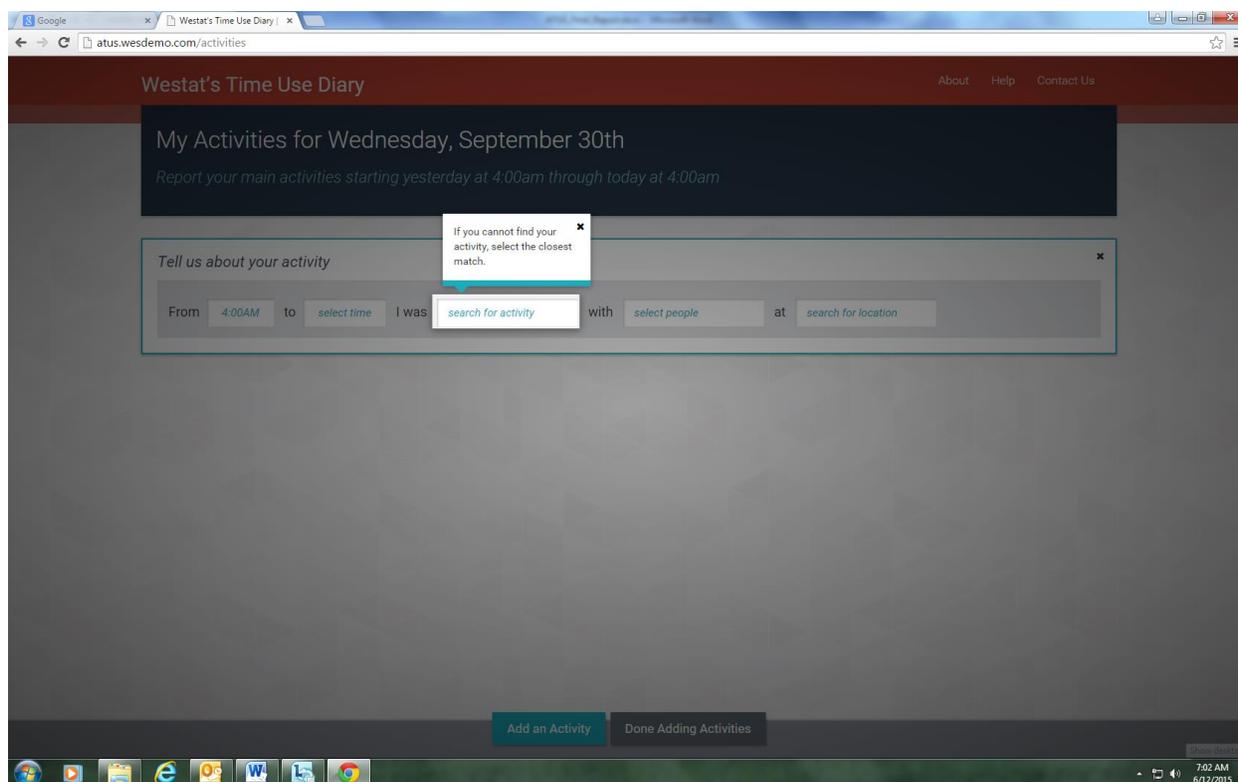
Closing the overlay enables the respondent to begin entering their activities. The mock-up features a narrative layout that makes the time use diary more engaging for the respondent to complete. The respondent begins by reporting their first activity. As shown in figure 3, the respondent enters the end time of their first activity, records what activity they were doing, who they were with, and records the location where they were at during the acivity. Time is initially shown in 5 minute increments. The respondent can use the widget to record when they stopped the activity. The mock-up also shows the duration of the activity.

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Figure 3. Recording time spent on activity

Next, the respondent records the activity that they were partipating in, who they were with, and their location. As shown in figure 4, the respondent simply begins typing in the text boxes and as the respondent is typing the mock-up will begin making suggestions for activities. There are only a few activities included in the mock-up, so this functionality is somewhat limited in the mock-up. However, the ability of the web diary to provide intelligent suggestions for activities, others who were with the respondent, and locations would be critical to the success of the actual instrument in production. Hence, this is a feature that would need to be enhanced and tested thoroughly in the creation of a web instrument. The current mock-up also does not include many dependencies in the current ATUS instrument. For example, if a respondent reports certain personal care activity the current ATUS instrument does not ask who the respondent he or she was with or the location. These dependencies would need to be programmed into the final ATUS web instrument.

Figure 4.   Recording activities, who was with respondent, and location
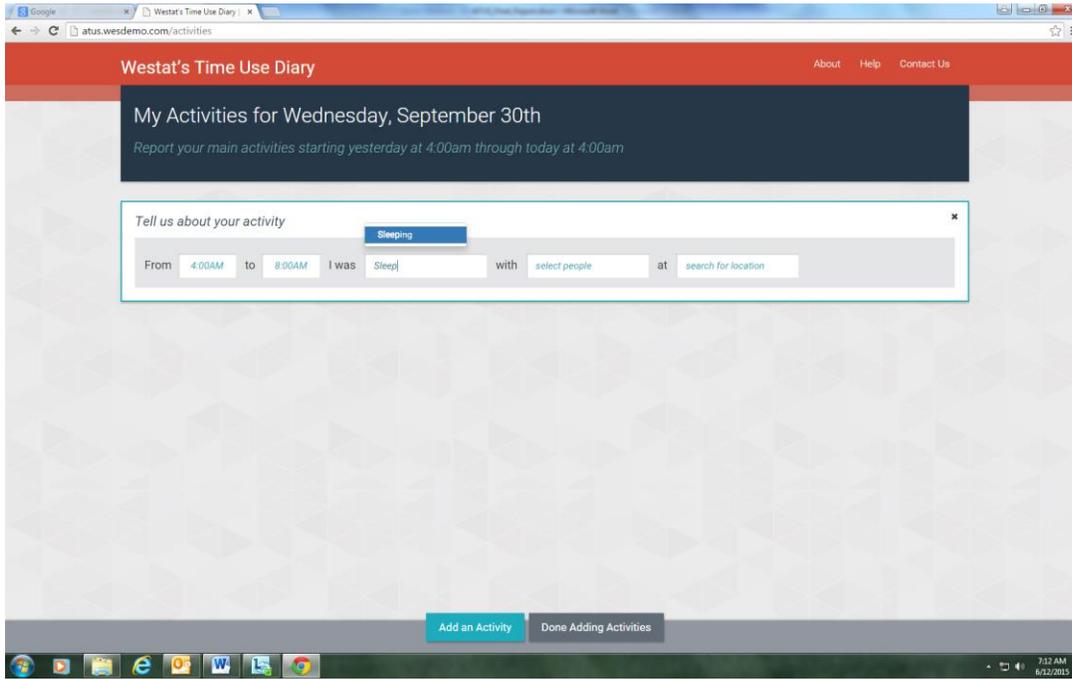
The respondent then enters all of their activities. Once the respondent is finished entering activities and clicks done adding activities the mock-up checks for any gaps as shown in figure 5.

Figure 5.   Checking for gaps in reported time use
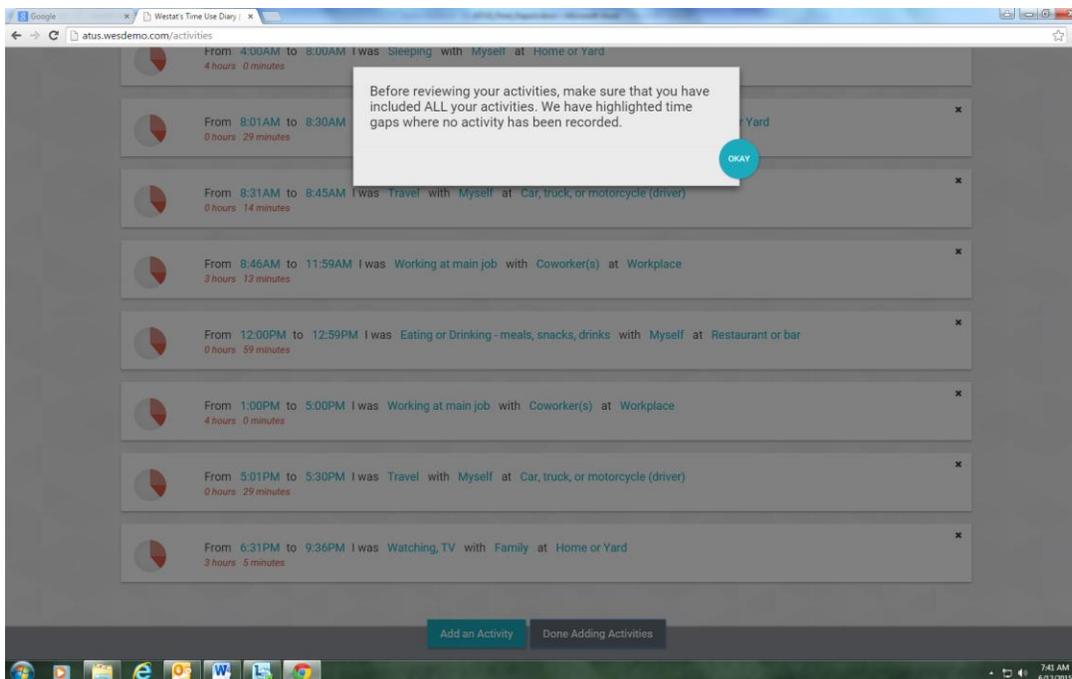
The mock-up then indicates the location of the gaps in the respondent's reported time. For example, the respondent in figure 6 did not reported activities in one time slot in the early evening and at the end of the day. The respondent can click on these gaps to complete the time diary.

Figure 6.   Identification of gaps in reported time use
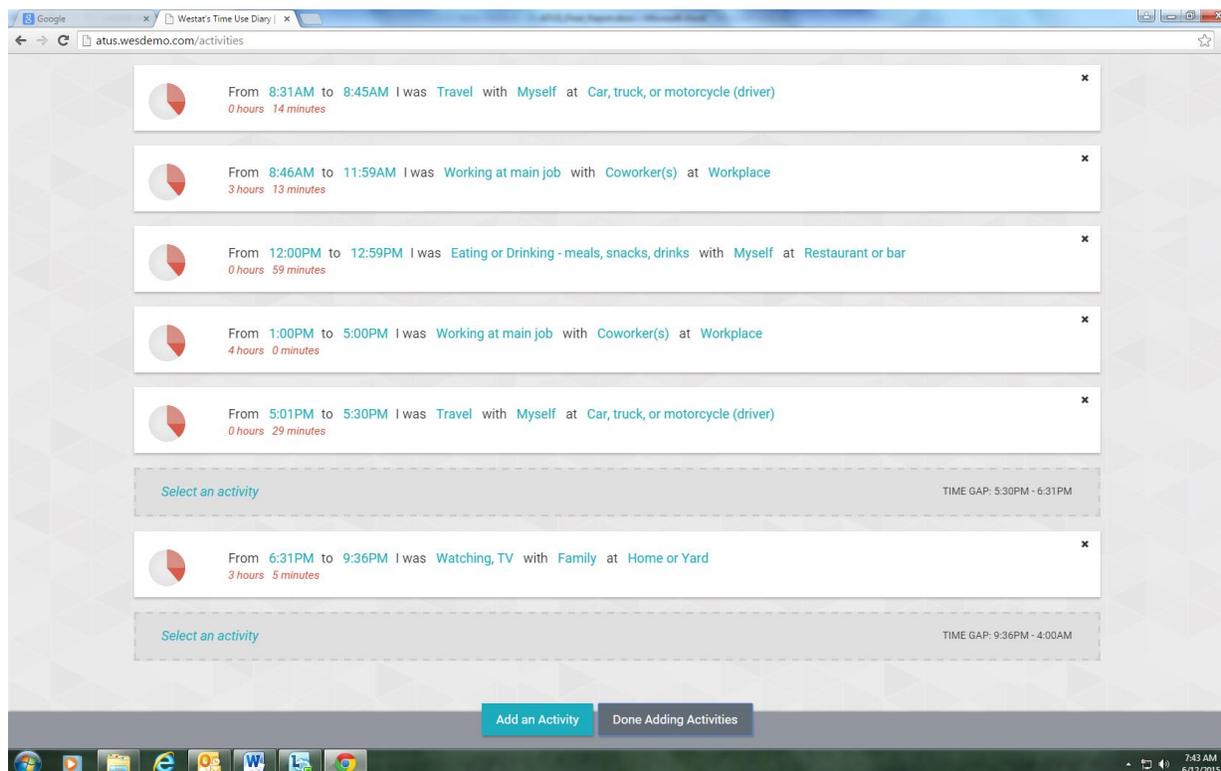
Once the respondent has completed entering all activities for the day they are taken to a summary screen where they can review their entries for the entire day (see figure 7). This provides the respondent with an opportunity to see their entire day in context and make any adjustments as needed.

Figure 7.   Example summary screen
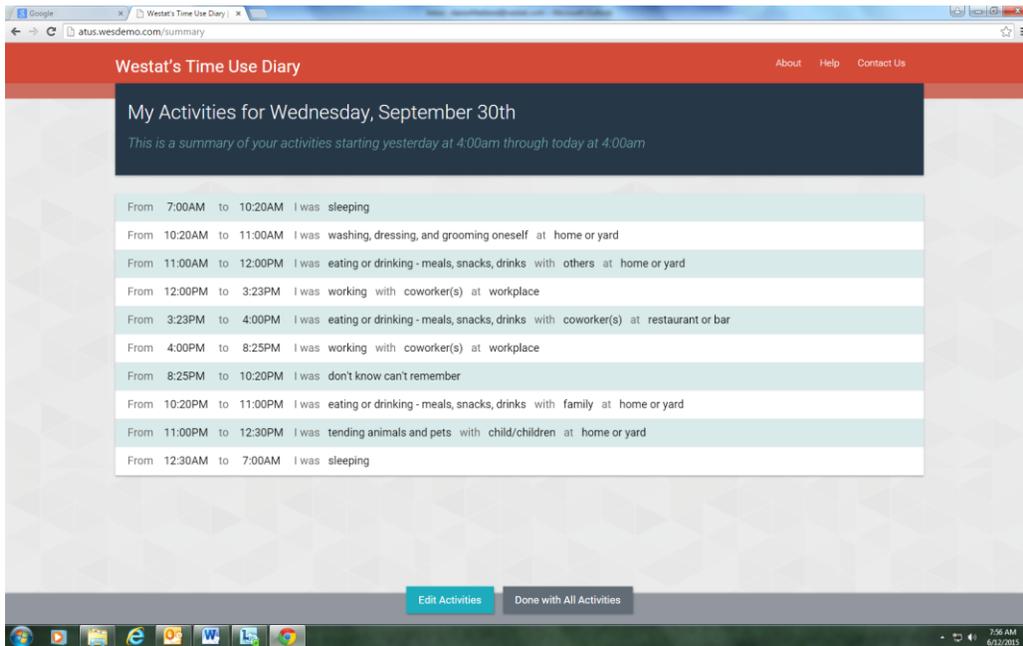
After finishing the time diary section of the instrument the mock-up shows an example of entering secondary activity. Figure 8 shows how a respondent could indicate during which activities during the day that a child was present by checking a box next to the activity.

Figure 8.   Example secondary activity screen

Bonke, J., & Fallesen, P. (2010). The impact of incentives and interview methods on response quantity and quality in diary-and booklet-based surveys. In Survey Research Methods, 4 (2), 91-101.

Millar, M. M., and Dillman, D. A. (2011). Improving response to Web and mixed-mode surveys Internet using address-based sampling and mail contact procedures. *Public Opinion Quarterly, 75*, 249-269.

Japanese time use survey paper diary

Difference in time use chart between Questionnaire A and Questionnaire B

The Survey on Time Use and Leisure Activities uses two types of questionnaire forms (Questionnaire A and Questionnaire B).Each questionnaire form has a time use chart.

Questionnaire A adopts a pre-coding method, while Questionnaire B adopts an after-coding method.

The difference between the two methods is explained as follows.

Pre-coding
The pre-coding method means a format to ask questions based on predetermined categories in the questionnaire form. It is also called a closed-ended question method. The Survey on Time Use and Leisure Activities conducted by the Statistics Bureau has adopted this method since the start of the survey in 1976 with regard to survey items to grasp the distribution of time use during 24 hours. Questionnaire A for the 2011 survey uses a form on which the kinds of activities (20 categories) have already been printed. Each household member is requested to classify his/her own activities, and draw a line in the column for the relevant activity parallel to the time division axis (see the example shown below).

Example of pre-coding method questionnaire form

Each household member is requested to classify his/her own activities, and draw a line in the column for the relevant kind of activity parallel to the time division axis on a form showing the kinds of activities (20 categories).

Kind of activities
1 Sleep
2 Personal care
3 Meals
4 Commuting to and from school or work
5 Work
6 Schoolwork
7 Housework
8 Caring or nursing
9 Child care
10 Shopping
11 Moving (excluding commuting)
12 Watching TV, listening to the radio, reading newspapers or magazines
13 Rest and relaxation
14 Learning, self-education, and training (except for schoolwork)
15 Hobbies and amusements
16 Sports
17 Volunteer and social activities
18 Social life
19 Medical examination or treatment
20 Other activities

Person(s) being together
a. Alone
b. Family member(s)
c. Classmate(s) or colleague(s)
d. Other person(s)

* Excerpt from "Questionnaire A" of the 2011 Survey on Time Use and Leisure Activities

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After-coding
The after-coding method means a format to allow a respondent to write answers freely on a questionnaire form as if he/she were writing a diary. For each activity specified on the form, a classification code will be provided based on predetermined classification criteria when summarizing questionnaire data. It is also called an open-ended question method. In addition to the existing pre-coding questionnaire form (Questionnaire A), the Survey on Time Use and Leisure Activities first adopted an after-coding questionnaire form as Questionnaire B in 2001, which allows each household member to specify the kinds of activity freely for the relevant time division (see the example shown below).
Example of after-coding method questionnaire form

* Excerpt from "Questionnaire B" of the 2011 Survey on Time Use and Leisure Activities

The pre-coding method adopted for Questionnaire A, which requires less processes for entry, review and classification/rating than the after-coding method, makes it possible to conduct surveys based on a large sample, and to summarize data by region and attribute in detail, as well as to publish the survey results quickly. Also, because this method has been adopted since the start of the survey, it is possible to compare data with past survey results in chronological order.

On the other hand, the after-coding method adopted for Questionnaire B, which enables us to define more detailed categories than the pre-coding method, makes it possible to understand detailed time use, such as for housework. Also, because many foreign countries have adopted this after-coding method, it is possible to compare data on time use with those of foreign countries.

National Statistics Omnibus Survey

Full-scale TUS diary - extract

Time am	What were you doing? Please record your main activity for each 10 minute period. Enter one main activity on each line	What else were you doing? Write in most important activity you were doing at the same time eg looking after children, listening to the radio or having a drink	Where were you? eg at home, at friends in car, on bus, train, cycling, walking	Were you with anybody? Please mark the boxes				
				Alone	Children up to 9 living in your household	Children aged 10 to 14 living in your household	Other household members	Other persons that you know
7.00 - 7.10				☐	☐	☐	☐	☐
7.10 - 7.20				☐	☐	☐	☐	☐
7.20 - 7.30				☐	☐	☐	☐	☐
7.30 - 7.40				☐	☐	☐	☐	☐
7.40 - 7.50				☐	☐	☐	☐	☐
7.50 - 8.00				☐	☐	☐	☐	☐
8.00 - 8.10				☐	☐	☐	☐	☐
8.10 - 8.20				☐	☐	☐	☐	☐
8.20 - 8.30				☐	☐	☐	☐	☐
8.30 - 8.40				☐	☐	☐	☐	☐
8.40 - 8.50				☐	☐	☐	☐	☐
8.50 - 9.00				☐	☐	☐	☐	☐

1

Time Use in Ireland

APPENDIX A

A. ACTIVITY GROUP	Code	Activity	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30	9:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45
					EARLY MORNING												MORNING																	
PERSONAL CARE /RESTING	1	SLEEPING	√	√	√	√	√	√	√	√	√	√	√	√	√	√																		
	2	RESTING/RELAXING doing nothing, 'time out'																																
	3	PERSONAL CARE washing, dressing, toilet																√																
	4	EATING/DRINKING/HAVING A MEAL																		√	√													
TRAVEL	5	TRAVEL including travel to and from work as well as leisure and domestic travel																					√	√										
PAID EMPLOYMENT OR STUDY	6	PAID EMPLOYMENT include paid and unpaid overtime, work from home, self-employment and farm work. Exclude lunch and other breaks.																							√	√	√	√	√	√		√	√	√
	7	STUDY, EDUCATION include courses, night classes, studying at home. Exclude lunch and other breaks.																																
	8	BREAKS FROM WORK OR STUDY include tea/coffee, smoking and lunch breaks.																													√			
HOUSEWORK AND OTHER HOUSEHOLD TASKS	9	COOKING & preparing food (including making lunches), washing-up																																
	10	CLEANING the house, doing the laundry, ironing, hoovering, tidying up																				√												
	11	HOUSE REPAIRS & maintenance, DIY, gardening																																
SHOPPING AND APPOINTMENTS	12	SHOPPING, MESSAGES/ERRANDS & APPOINTMENTS shopping for food or leisure, services e.g. hairdressers, visiting doctor, paying bills																																
CARING FOR OTHERS	13	CHILDCARE looking after children, physical care, supervision																	√	√	√	√	√	√	√									
	14	PLAYING AND TALKING WITH CHILDREN include reading, games, helping with homework, accompanying children to activities																																
	15	CARING FOR ADULTS with special needs or elderly persons, either in your home or elsewhere (e.g. help with personal care)																																
VOLUNTARY AND RELIGIOUS ACTIVITY	16	VOLUNTARY ACTIVITY for a charitable organisation, sports club or other organisation, include meetings & informal helping outside the home																																
	17	RELIGIOUS ACTIVITY Attending religious services, prayer																																
SOCIALISING AND GOING OUT	18	SPENDING TIME/CHATTING WITH FAMILY, FRIENDS, NEIGHBOURS including spouse																																
	19	PHONING/TEXTING FAMILY, FRIENDS, NEIGHBOURS include writing a letter																																
	20	EATING OUT/GOING TO THE PUB include going to cafes, bars, restaurants, nightclubs																																
	21	GOING OUT to concerts, theatre, cinema, galleries, sporting events, bookies, bingo																																
SPORTS & LEISURE	22	PLAYING SPORTS, EXERCISE AND OUTDOOR ACTIVITY including playing football, walking the dog, going to the park																																
	23	COMPUTER/INTERNET FOR PERSONAL USE e.g. play station, x-box, surfing the net, email, using computer for leisure, shopping																																
	24	HOBBIES AND OTHER LEISURE ACTIVITIES e.g. playing musical instruments, playing cards, other games																																
TV, RADIO, READING	25	WATCHING TV and videos/DVDs																																
	26	READING a book, magazine or newspaper or LISTENING to radio or music																																

B. WHO WERE YOU WITH? Tick all that apply.		4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30	9:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45
	No-one/I was alone																					√	√	√	√	√	√	√	√	√	√	√	√
	Spouse/partner	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√														
	Own children under 18	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√											
	Other person or people I know well																																

C. WHERE WERE YOU?		4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30	9:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45
	At home	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√												
	Away from home																					√	√	√	√	√	√	√	√	√	√	√	√

Westat®

New Zealand time use survey paper diary

Westat®

Sec1:2-Sec1:3

Example — Morning of Day 1: 7am – 10am

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

7:00am / 05 / 10 / 15 / 20 / 25 — Sleeping — 7:00am / 05 / 10 / 15 / 20 / 25 — Home

7:30am / 35 — Got dressed — 7:30am / 35

40 / 45 — Made breakfast — Talked to partner — 40 / 45

50 / 55 — Ate breakfast — 50 / 55

8:00am / 05 — Internet banking — Checked email — 8:00am / 05

10 / 15 / 20 / 25 — Drove to shops — Listened to music — 10 / 15 / 20 / 25 — Car

8:30am / 35 — Went grocery shopping — 8:30am / 35 — Shops

40 / 45 — Drove to work — Listened to music — 40 / 45 — Car

50 / 55 — 50 / 55

9:00am — Work — 9:00am — Work

05 / 10 / 15 / 20 / 25 — Work break morning tea / Work — Drank coffee and chatted — 05 / 10 / 15 / 20 / 25

9:30am / 35 / 40 / 45 / 50 / 55 — 9:30am / 35 / 40 / 45 / 50 / 55

10:00am — 10:00am

A | B | C | D — 1 — 2 — 3 — 4

Please complete both pages

2 — 3

Sec1:4-Sec1:5

Morning of Day 1: 4am – 7am

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

4:00am / 05 / 10 / 15 / 20 / 25 — 4:00am / 05 / 10 / 15 / 20 / 25

4:30am / 35 / 40 / 45 / 50 / 55 — 4:30am / 35 / 40 / 45 / 50 / 55

5:00am / 05 / 10 / 15 / 20 / 25 — 5:00am / 05 / 10 / 15 / 20 / 25

5:30am / 35 / 40 / 45 / 50 / 55 — 5:30am / 35 / 40 / 45 / 50 / 55

6:00am / 05 / 10 / 15 / 20 / 25 — 6:00am / 05 / 10 / 15 / 20 / 25

6:30am / 35 / 40 / 45 / 50 / 55 — 6:30am / 35 / 40 / 45 / 50 / 55

7:00am — 7:00am

A | B | C | D — 1 — 2 — 3 — 4

Please complete both pages

4 — 5

Westat®

Sec1:6-Sec1:7

Morning of Day 1: 7am – 10am

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

7:00am		7:00am
.05		.05
.10		.10
.15		.15
.20		.20
.25		.25
7:30am		7:30am
.35		.35
.40		.40
.45		.45
.50		.50
.55		.55
8:00am		8:00am
.05		.05
.10		.10
.15		.15
.20		.20
.25		.25
8:30am		8:30am
.35		.35
.40		.40
.45		.45
.50		.50
.55		.55
9:00am		9:00am
.05		.05
.10		.10
.15		.15
.20		.20
.25		.25
9:30am		9:30am
.35		.35
.40		.40
.45		.45
.50		.50
.55		.55
10:00am		10:00am

A B C D   1   2   3   4

Please complete both pages →

6   7

Sec1:8-Sec1:9

Middle of Day 1: 10am – 1pm

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

10:00am		10:00am
.05		.05
.10		.10
.15		.15
.20		.20
.25		.25
10:30am		10:30am
.35		.35
.40		.40
.45		.45
.50		.50
.55		.55
11:00am		11:00am
.05		.05
.10		.10
.15		.15
.20		.20
.25		.25
11:30am		11:30am
.35		.35
.40		.40
.45		.45
.50		.50
.55		.55
12:00pm		12:00pm
.05		.05
.10		.10
.15		.15
.20		.20
.25		.25
12:30pm		12:30pm
.35		.35
.40		.40
.45		.45
.50		.50
.55		.55
1:00pm		1:00pm

A B C D   1   2   3   4

Please complete both pages →

8   9

Westat®

Sec1:10-Sec1:11

◎ Afternoon of   Day 1: 1pm – 4pm

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

Time rows (left): 1:00pm, 05, 10, 15, 20, 25, 1:30pm, 35, 40, 45, 50, 55, 2:00pm, 05, 10, 15, 20, 25, 2:30pm, 35, 40, 45, 50, 55, 3:00pm, 05, 10, 15, 20, 25, 3:30pm, 35, 40, 45, 50, 55, 4:00pm

Time rows (right): 1:00pm, 05, 10, 15, 20, 25, 1:30pm, 35, 40, 45, 50, 55, 2:00pm, 05, 10, 15, 20, 25, 2:30pm, 35, 40, 45, 50, 55, 3:00pm, 05, 10, 15, 20, 25, 3:30pm, 35, 40, 45, 50, 55, 4:00pm

A B C D   1   2   3   4

Please complete both pages →

10   ☐ 11

Sec1:12-Sec1:13

◎ Afternoon of   Day 1: 4pm – 7pm

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

Time rows (left): 4:00pm, 05, 10, 15, 20, 25, 4:30pm, 35, 40, 45, 50, 55, 5:00pm, 05, 10, 15, 20, 25, 5:30pm, 35, 40, 45, 50, 55, 6:00pm, 05, 10, 15, 20, 25, 6:30pm, 35, 40, 45, 50, 55, 7:00pm

Time rows (right): 4:00pm, 05, 10, 15, 20, 25, 4:30pm, 35, 40, 45, 50, 55, 5:00pm, 05, 10, 15, 20, 25, 5:30pm, 35, 40, 45, 50, 55, 6:00pm, 05, 10, 15, 20, 25, 6:30pm, 35, 40, 45, 50, 55, 7:00pm

A B C D   1   2   3   4

Please complete both pages →

12   ☐ 13

Sec1:14-Sec1:15

Evening of   Day 1: 7pm – 10pm

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

7:00pm / 05 / 10 / 15 / 20 / 25 / 7:30pm / 35 / 40 / 45 / 50 / 55 / 8:00pm / 05 / 10 / 15 / 20 / 25 / 8:30pm / 35 / 40 / 45 / 50 / 55 / 9:00pm / 05 / 10 / 15 / 20 / 25 / 9:30pm / 35 / 40 / 45 / 50 / 55 / 10:00pm

A B C D   1   2   3   4

Please complete both pages

14   15

Sec1:16-Sec1:17

Night of   Day 1: 10pm – 1am

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

10:00pm / 05 / 10 / 15 / 20 / 25 / 10:30pm / 35 / 40 / 45 / 50 / 55 / 11:00pm / 05 / 10 / 15 / 20 / 25 / 11:30pm / 35 / 40 / 45 / 50 / 55 / 12:00am / 05 / 10 / 15 / 20 / 25 / 12:30am / 35 / 40 / 45 / 50 / 55 / 1:00am

A B C D   1   2   3   4

Please complete both pages

16   17

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Sec1:18-Sec1:19

Morning of   Day 2: 1am – 4am

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

1:00am, 05, 10, 15, 20, 25, 1:30am, 35, 40, 45, 50, 55, 2:00am, 05, 10, 15, 20, 25, 2:30am, 35, 40, 45, 50, 55, 3:00am, 05, 10, 15, 20, 25, 3:30am, 35, 40, 45, 50, 55, 4:00am

A B C D

1   2   3   4

Please complete both pages

18   19

Sec1:20-Sec1:21

Morning of   Day 2: 4am – 7am

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

4:00am, 05, 10, 15, 20, 25, 4:30am, 35, 40, 45, 50, 55, 5:00am, 05, 10, 15, 20, 25, 5:30am, 35, 40, 45, 50, 55, 6:00am, 05, 10, 15, 20, 25, 6:30am, 35, 40, 45, 50, 55, 7:00am

A B C D

1   2   3   4

Please complete both pages

20   21

Westat®

Sec1:22-Sec1:23

Morning of   Day 2: 7am – 10am

					Who else was with you?				
Office Use Only	What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)		alone	family I live with	family I don't live with	other people I know	people I don't know

Times: 7.00am, .05, .10, .15, .20, .25, 7.30am, .35, .40, .45, .50, .55, 8.00am, .05, .10, .15, .20, .25, 8.30am, .35, .40, .45, .50, .55, 9.00am, .05, .10, .15, .20, .25, 9.30am, .35, .40, .45, .50, .55, 10.00am

A B C D   1   2   3   4

Please complete both pages

22   23

Sec1:24-Sec1:25

Middle of   Day 2: 10am – 1pm

					Who else was with you?				
Office Use Only	What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)		alone	family I live with	family I don't live with	other people I know	people I don't know

Times: 10.00am ... 1.00pm

A B C D   1   2   3   4

Please complete both pages

24   25

Sec1:26-Sec1:27

◎ Afternoon of Day 2: 1pm – 4pm

Office Use Only					What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member						alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+									

Time markers left column: 1:00pm, 05, 10, 15, 20, 25, 1:30pm, 35, 40, 45, 50, 55, 2:00pm, 05, 10, 15, 20, 25, 2:30pm, 35, 40, 45, 50, 55, 3:00pm, 05, 10, 15, 20, 25, 3:30pm, 35, 40, 45, 50, 55, 4:00pm

Time markers right column: 1:00pm, 05, 10, 15, 20, 25, 1:30pm, 35, 40, 45, 50, 55, 2:00pm, 05, 10, 15, 20, 25, 2:30pm, 35, 40, 45, 50, 55, 3:00pm, 05, 10, 15, 20, 25, 3:30pm, 35, 40, 45, 50, 55, 4:00pm

A B C D | 1 | 2 | 3 | 4

Please complete both pages

26 | 27

Sec1:28-Sec1:29

◎ Evening of Day 2: 4pm – 7pm

Office Use Only					What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member						alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+									

Time markers left column: 4:00pm, 05, 10, 15, 20, 25, 4:30pm, 35, 40, 45, 50, 55, 5:00pm, 05, 10, 15, 20, 25, 5:30pm, 35, 40, 45, 50, 55, 6:00pm, 05, 10, 15, 20, 25, 6:30pm, 35, 40, 45, 50, 55, 7:00pm

Time markers right column: 4:00pm, 05, 10, 15, 20, 25, 4:30pm, 35, 40, 45, 50, 55, 5:00pm, 05, 10, 15, 20, 25, 5:30pm, 35, 40, 45, 50, 55, 6:00pm, 05, 10, 15, 20, 25, 6:30pm, 35, 40, 45, 50, 55, 7:00pm

A B C D | 1 | 2 | 3 | 4

Please complete both pages

28 | 29

Westat®

Sec1:30-Sec1:31

Night of   Day 2: 7pm – 10pm

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

7:00pm / 05 / 10 / 15 / 20 / 25 / 7:30pm / 35 / 40 / 45 / 50 / 55 / 8:00pm / 05 / 10 / 15 / 20 / 25 / 8:30pm / 35 / 40 / 45 / 50 / 55 / 9:00pm / 05 / 10 / 15 / 20 / 25 / 9:30pm / 35 / 40 / 45 / 50 / 55 / 10:00pm

A | B | C | D

1 | 2 | 3 | 4

Please complete both pages

30 | 31

Sec1:32-Sec1:33

Night of   Day 2: 10pm – 1am

Office Use Only				What were you doing?	What else were you doing at the same time?	Where were you or how were you travelling? (eg work, shops, car, bus)	Who else was with you?				
HHLD Member		NonHHLD Member					alone	family I live with	family I don't live with	other people I know	people I don't know
0-13	14+	0-13	14+								

10:00pm / 05 / 10 / 15 / 20 / 25 / 10:30pm / 35 / 40 / 45 / 50 / 55 / 11:00pm / 05 / 10 / 15 / 20 / 25 / 11:30pm / 35 / 40 / 45 / 50 / 55 / 12:00am / 05 / 10 / 15 / 20 / 25 / 12:30am / 35 / 40 / 45 / 50 / 55 / 1:00am

A | B | C | D

1 | 2 | 3 | 4

Please complete both pages

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Canadian Time Use Survey Web Diary

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Statistics Canada   Canada

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Start of questionnaire ▸ Getting Started   Logout

Time-management and its challenges

Getting Started   1%

Why do we conduct this survey?

The two primary objectives of the General Social Survey (GSS) are: to gather data on social trends in order to monitor changes in the living conditions and well being of Canadians over time; and to provide information on specific social policy issues of current or emerging interest.

This survey on time management and its challenges has for purpose to understand how much time we spend on various daily activities. The information will be used especially to better understand the effect and cost of time stress, commuting times, time spent on paid and unpaid work and sleeping patterns of Canadians. Furthermore, we will be able to measure if technology makes us gain or lose time. Canada is amongst 89 other countries engaged in time studies.

Although your participation is voluntary, your cooperation is important so that the information collected will be as accurate and complete as possible.

Other important information

▸ How are we authorized to collect this information?

▸ Your answers are confidential

▸ Record linkages

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Start of questionnaire ▶ Demography
Logout

Time-management and its challenges
Demography
3%

1. Are you:

○ male?
◉ female?

2. What is your age?

37 ▼

3. What is your marital status?
"Common-law" means partners living together as a couple without being legally married.

◉ Married
○ Living common-law
○ Widowed
○ Separated
○ Divorced
○ Single, never married

4. How many children under the age of 18 live in your household?

3

Stop & Finish Later   < Previous   Next >

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Start of questionnaire » Time-use diary   Logout
Time-management and its challenges
Time-use diary   [   ] 7%

5.   What were you doing at **4:00 AM**

○ Sleeping and own personal care
    › Sleeping, washing, dressing, private activities, health

○ Parenting, care and assitance to others
    › Household and non-household child or adult, friends and neighbours

○ Eating and drinking
    › Meals, snacks, coffee

○ Studying and learning
    › Main schooling, homework, personal enjoyment

○ Paid work
    › Main work, looking for work, other income generating activities

○ Travel and going from place to place
    › Work, school, shopping, social

○ Household chores and maintenace
    › Meal preparation, indoor maintenance, household management, outdoor maintenance, gardening, pet care

○ Shopping or using services
    › Goods, services, research, selling

○ Socializing and commuinicating
    › Talking, phone, text

○ Civic, religious and organizational activities
    › Religious, organisational, voluntary work

○ Sports, exercises and outdoor activities
    › Exercises, recreational sports, competitive sports, coaching

○ Other activities such as leisure, hobbies and downtime
    › Reading, writing, watching TV, theatre, arts and hobbies

[Stop & Finish Later]   [< Previous] [Next >]

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Statistics Canada   Canadä

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Start of questionnaire > Time-use diary   Logout
Time-management and its challenges
Time-use diary   [8%   ]

6.   What were you doing more specifically?

        Sleeping and own personal care
        4:00 AM

        ○ Transport to or from activity

        ○ Sleeping, napping, resting, relaxing, sick in bed

        ○ Personal - hygiene, washing, dressing, hair care, brushing teeth

        ○ Praying, spiritual activities, meditating

        ○ Sexual activities

        ○ Health professional visit, consultation

        ○ Taking blood pressure, sugar level, medication, treatment

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Start of questionnaire › Time-use diary   Logout

Time-management and its challenges   [   ] 9%
Time-use diary

7.   Starting at 4:00 AM how much time did this activity last?

         4:00 AM ;

         Hours   Minutes

         <<< Hours >>> [▼]   <<< Minutes >>> [▼]

Stop & Finish Later   < Previous   Next >

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Start of questionnaire ▸ Time-use diary   Logout

Time-management and its challenges
Time-use diary   ▮ 10%

8.   Please indicate if you were doing one of these activities at the same time.

      4:00 AM ;

      ○ Supervising kids' homework or activites

      ○ Preparing meal

      ○ Eating or drinking

      ○ Doing laundry

      ○ Organizing, planning, paying bills

      ○ Pet care

      ○ Listening to music/radio

      ○ Watching TV, videos

      ○ Reading newspaper

      ○ emailing, texting

      ○ Social networking

      ○ Chatting, talking

      ○ No other activity

Stop & Finish Later   **< Previous** **Next >**

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Start of questionnaire › Time-use diary   Logout
Time-management and its challenges
Time-use diary   [11%]

9.   During this time period, did you use any information technology device such as tablet, smartphone, computer, or laptop?
        4:00 AM ;

        ○ Yes
        ○ No

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Start of questionnaire ▶ Time-use diary

Time-management and its challenges
Time-use diary   [12%]

10.   Where were you?

        4:00 AM ;

        ○ At home or property

        ○ At work place or school

        ○ At someone else's home or property

        ○ In the neighbourhood

        ○ Outdoors

        ○ Grocery store, other stores, mall

        ○ Library, museum, theatre

        ○ Sports centre, gym, field or arena

        ○ Restaurant, bar, club

        ○ Health facility or clinic

        ○ Place of worship

        ○ Elsewhere

Stop & Finish Later   **< Previous**   **Next >**

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Logout

Time-management and its challenges
Time-use diary

12%

10.   Where were you?

4:00 AM ;

- ○ At home or property
- ○ At work place or school
- ○ At someone else's home or property
- ○ In the neighbourhood
- ○ Outdoors
- ○ Grocery store, other stores, mall
- ○ Library, museum, theatre
- ○ Sports centre, gym, field or arena
- ○ Restaurant, bar, club
- ○ Health facility or clinic
- ○ Place of worship
- ○ Elsewhere

Stop & Finish Later

< Previous   **Next >**

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of Canada   du Canada

Statistics Canada   Canada

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Start of questionnaire ▸ Time-use diary   Logout
Time-management and its challenges
Time-use diary   [22%]

12.   On a scale of -3 to +3 where -3 means very unpleasant and +3 means very pleasant; at **5 o'clock**, how would you rate the activity you were doing?

⚪ -3

⚪ -2

⚪ -1

⚪ 0

⚪ +1

⚪ +2

⚪ +3

Stop & Finish Later   < Previous   Next >

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Start of questionnaire ⇾ Time use diary   Logout
Time use and its challenges
Time use diary   50%

What were you doing at 4:00 AM?

<<< Select >>> ▼

Starting at 4:00 AM, how long did this activity last?

<<< Hour >>> ▼   <<< Minute >>> ▼

Please indicate if you were doing any of these activities at the same time.

4:00 AM ;

Simultaneous Activity 1
<<< Select >>> ▼

Simultaneous Activity 2
<<< Select >>> ▼

Where were you?

4:00 AM ;

<<< Select >>> ▼

Who was with you?

4:00 AM ;
Select all that apply

☐ On my own
OR
☐ Spouse, partner
☐ Household child, children (less than 15 years old)
☐ Household child, children (15 years or older)
☐ Parents or parents-in-law
☐ Other household adult(s)
☐ Other family member(s) from other households
☐ Friend(s)
☐ Colleague(s), classmate(s)
☐ Other people

During this time period, did you use any information technology device such as a tablet, smartphone, computer or laptop?

4:00 AM ;

○ Yes
○ No

Stop & Finish Later   < Previous   Next >

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Start of questionnaire ▸ Time use diary   Logout

Time use and its challenges
Time use diary   [43%   ]

What were you doing at **4:00 AM**?

Sleeping, napping, resting, relaxing, sick in bed   ▾

Sleeping
   Sleeping, napping, resting, relaxing, sick in bed
Own personal care
   Personal - hygiene, washing, dressing, hair care, brushing teeth
   Praying, spiritual activities, meditating
   Sexual activities
   Health professional visit, consultation
   Taking blood pressure, sugar level, medication, treatment
Eating or drinking
   Preparation - meals, snacks, lunches
   Eating or drinking - Meals, snacks, drinks
Paid work activities
   Working at main job or other jobs
   Business travel
   Looking for work
   Other income-generating activities
   Paid training
   Personal appointment
   Break or lunch
Studying or learning
   Main schooling full time/part time - on site
   Main schooling full time/part time - online
   Homework
   Self development
   Break or lunch
   Leisure and special interest classes
Travel and going from place to place
   Transport to or from activity
Household chores or maintenance
   Preserving foods - baking, freezing, sealing, packing goods

Stop & F   < Previous   Next >

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Start of questionnaire > Time use diary   Logout
Time use and its challenges
Time use diary   [57%]

Starting at 4:00 AM, how long did this activity last?

<<< Hour >>> [ ]   <<< Minute >>> [ ]

Please indicate if you were doing any of these activities at the same time.

4:00 AM ;

Simultaneous Activity 1
<<< Select >>> [ ]

Simultaneous Activity 2
<<< Select >>> [ ]

Where were you?

4:00 AM ;

<<< Select >>> [ ]

Who was with you?

4:00 AM ;
Select all that apply

☐ On my own
OR
☐ Spouse, partner
☐ Household child, children (less than 15 years old)
☐ Household child, children (15 years or older)
☐ Parents or parents-in-law
☐ Other household adult(s)
☐ Other family member(s) from other households
☐ Friend(s)
☐ Colleague(s), classmate(s)
☐ Other people

During this time period, did you use any information technology device such as a tablet, smartphone, computer or laptop?

4:00 AM ;

○ Yes
○ No

[Stop & Finish Later]   [< Previous] [Next >]

Attention

> You have indicated different locations between activities but you did not enter a transportation activity. Please use the **"Previous"** button and select **"Transport to or from activity"** from the activity list to report transportation as a separate entry.

Starting at 4:00 PM, how long did this activity last?

[1 ▼] [00 ▼]

Please indicate if you were doing any of these activities at the same time.

4:00 PM ;

Simultaneous Activity 1
[Doing laundry ▼]

Simultaneous Activity 2
[Parenting, care or assistance to others ▼]

Where were you?

4:00 PM ;

> **You have indicated different locations between activities but you did not enter a transportation activity. Please use the "Previous" button and select "Transport to or from activity" from the activity list to report transportation as a separate entry.**

[At place of work or school ▼]

Modular Online Time Use Survey (MOTUS)

UK Millennium Study

UK Millennium Study

Activities	Early morning				
	4am	5am	6am	7am	8am
− What were you doing?	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50	10 20 30 40 50
+ Sleep and personal care					
+ School, homework, and education					
+ Paid or unpaid work					
+ Chores, housework, and looking after people or animals					
+ Eating and drinking					
+ Physical exercise and sports					

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You have skipped some time - please make sure that you complete the diary for the full day! ✕

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Wu et al. (2012)

Appendix I An example of the calendar-style interface diary used in web surveys: (A) input the location and time of an event; (b) input an activity; (c) summary of the activities appeared after all activities were inputted ; (d) after confirming all the activities, the final question was to ask about the indoor/outdoor/in vehicle status for each event listed.

(a)

(b)

(c)

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(d)

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Appendix II An example of the dialogue-style interface diary used in web surveys

<u>ACT24</u>

National Cancer Institute (NCI) has developed a physical activity evaluation tool that asks respondents to recall and report in 5 minute increments everything they did yesterday. Respondents must choose from a pre-populated list of activities falling into multiple categories, including sleeping, eating, working, reading, and exercising. The combination of activity, level of excretion, and stance/position are tied to predefined classifications of activity levels (light, moderate, vigorous) and behavior (sleeping, sedentary, active, mixed) based on a defined scoring algorithm. F2 is the hotkey that will end the tutorial should you want to skip.

1. Tutorial Screen 1

   The tutorial pops up immediately after the respondent has entered the survey. The screen below shows the start of the tutorial.
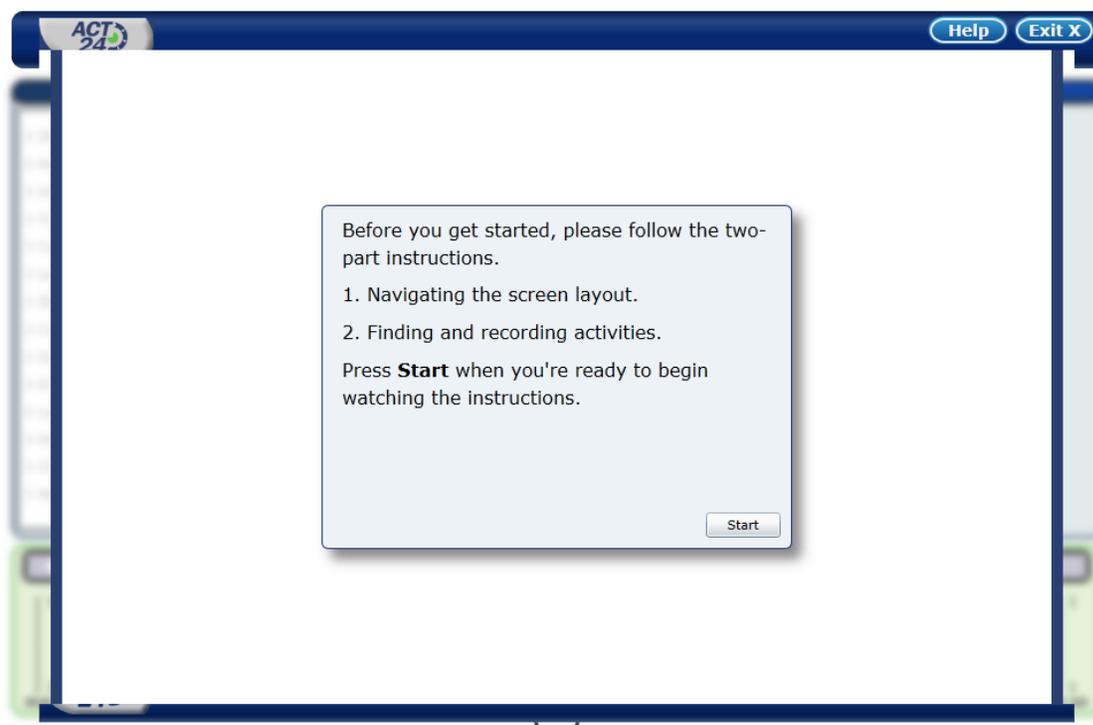
2. Tutorial Screen 2

This screen shows the first part of the tutorial.
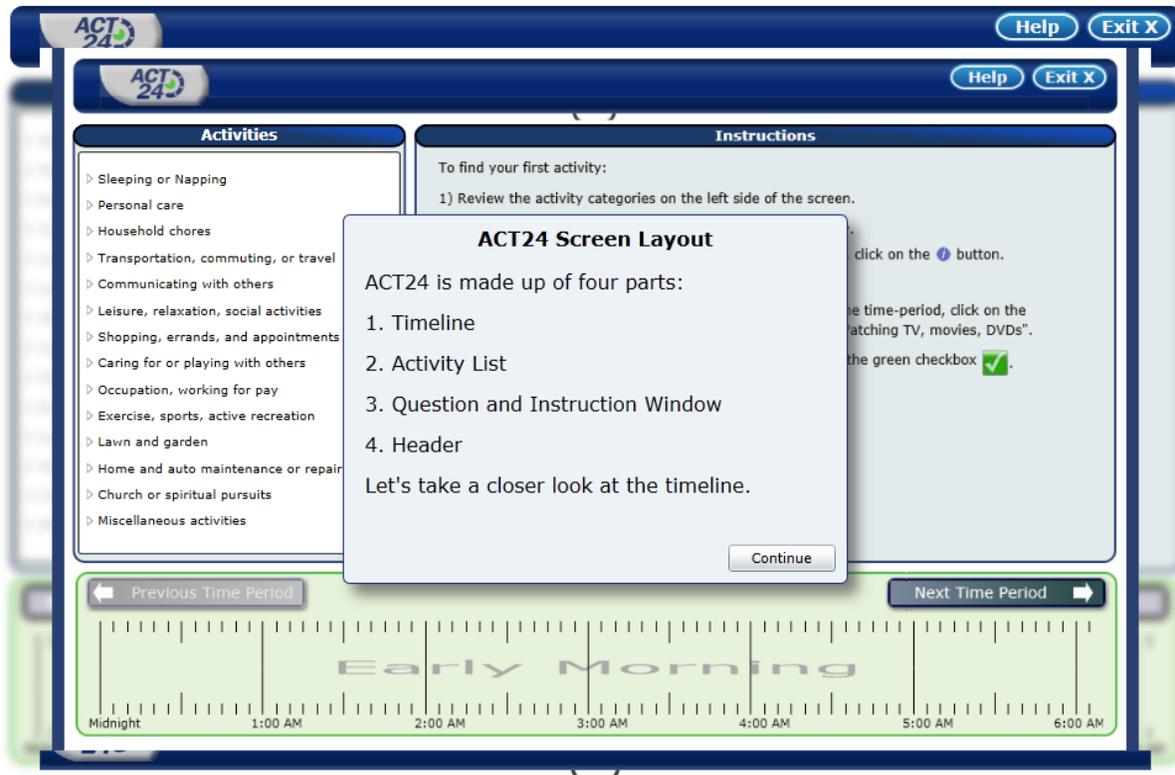
3. Tutorial Screen 3

Tutorial screen 3 show the respondent that he or she will be reporting for a 24 hour day.

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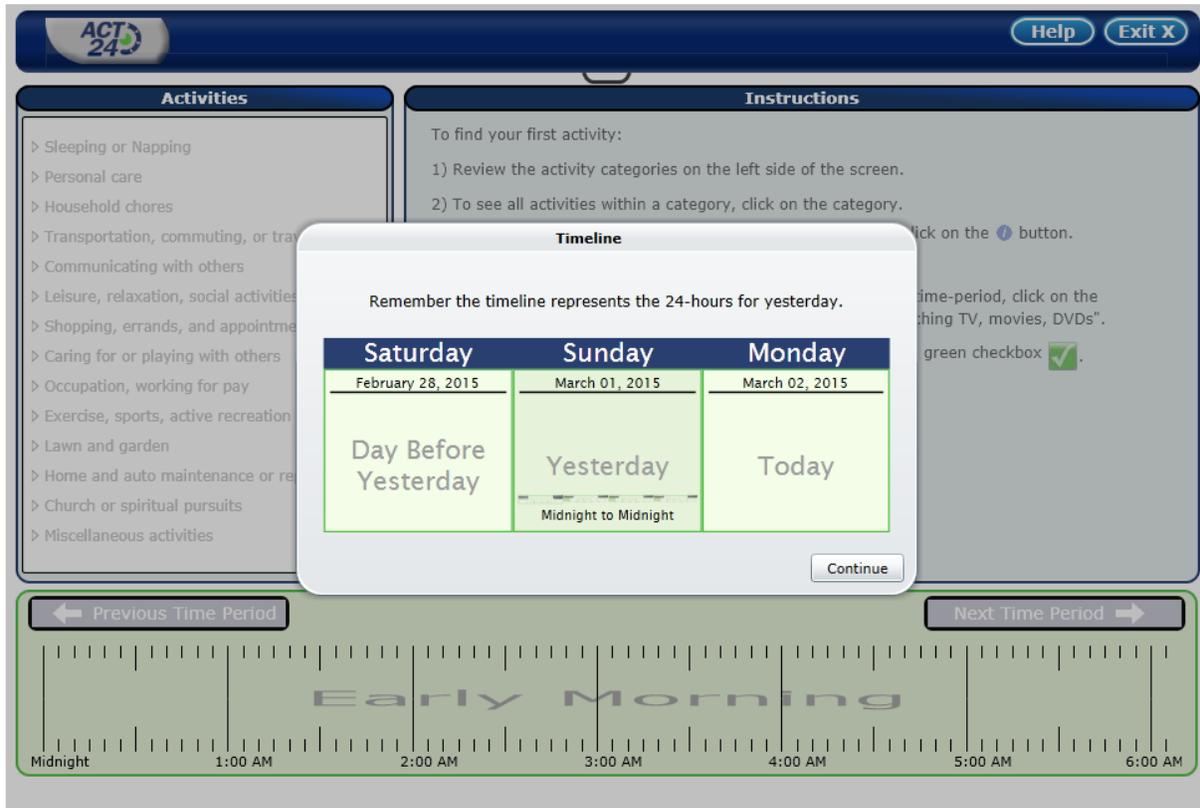
4. Activity Screen 1

This screen shows the respondent entering the first activity, which is sleeping.

5. Activity Screen 2

    Activity screen 2 shows the respondent entering the start time and the finish time for an
    activity and then choosing the type of activity and the purpose of the activity.

6. Activity Screen 3

Activity screen 3 shows a gap that the respondent has created in the reporting. The red patch is the gap.

7.   Prompt Screen 1 for Missing Activity

The survey has detected a gap and prompts the respondent to fill in the gap with an activity.
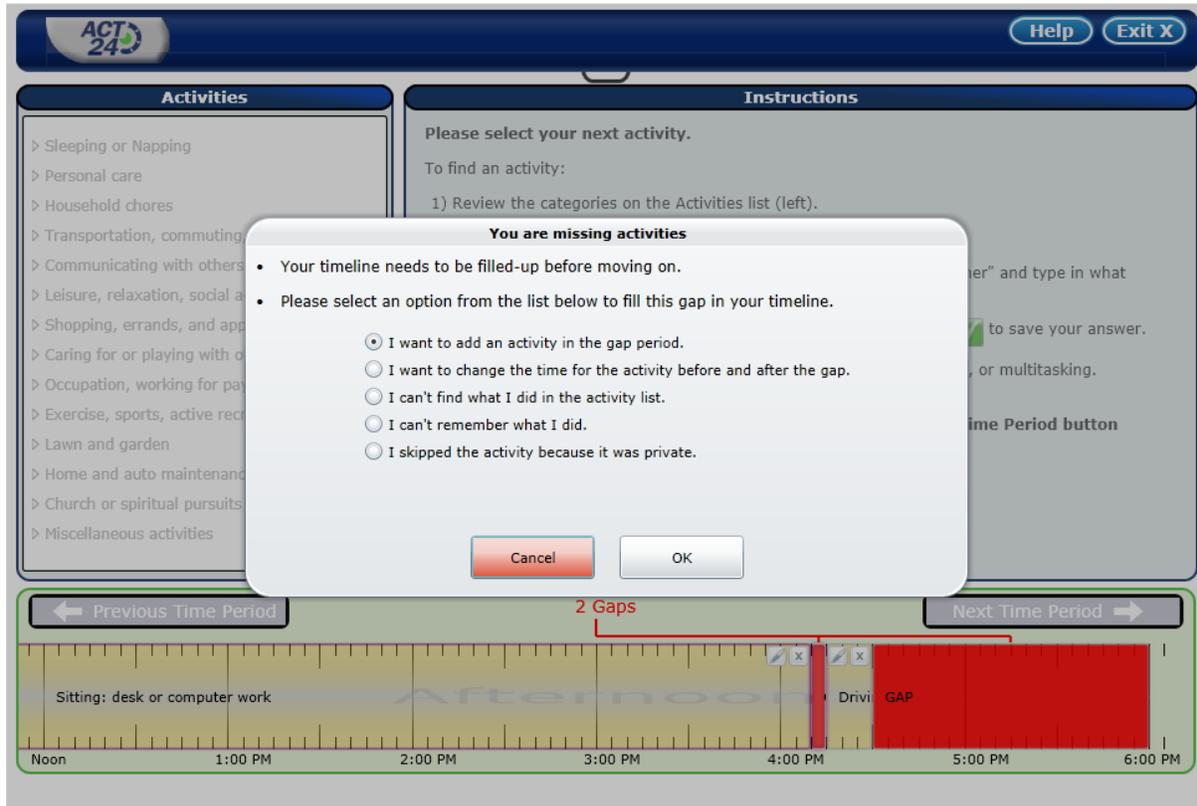
8. Activity Screen 4 for an Activity Not on the Pick LIst

    The respondent was engaged in an activity not on the pick list. The respondent typed in his or her activity.

ASA24

ASA24 is NCI's dietary assessment tool of a 24-hour recall – either midnight to midnight yesterday or the last 24 hours relative to when respondent starts the reporting session. The version shown in the screen shots was programmed using Microsoft Silverlight. A new version is under development that will be browser based and will render nicely on tablet and smartphones. The new version will also have the option for respondents to use as a diary (i.e., a food record) where they in real time rather than relying on recall.

1. Screen 1 is an introductory screen that explains the reporting requirements to the respondent. The avatar is a talking penguin who explains the survey to the respondent.

It is important that you report **EVERYTHING** you had to eat and drink yesterday.

TIP: It's often easier to do this in one sitting, but if you can't finish now, you can come back to finish later today.

Thank you for participating!

Previous   Next
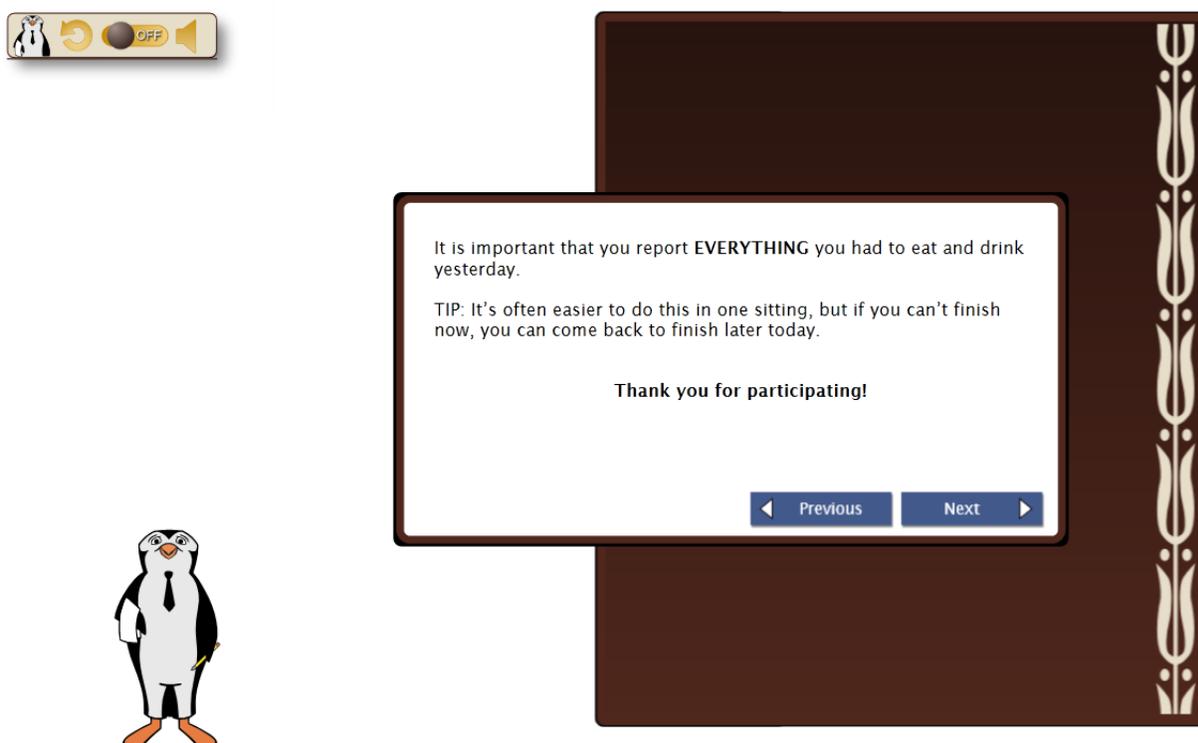
2. Screen shot 2 -- First Screen Where Reporting Begins

This is the first screen where the respondent can begin to enter his or her food and drink.

3. Screen Shot 3 – Choose a Meal or a Snack

First the respondent enters whether the food and drink is a meal or a snack and provide details about when and where the food or drink was consumed.

4. Screen Shot 4 -- Pick List or Type in

The respondent can either pick his or her foods from a pick list or check "other" and type in the name of the food.
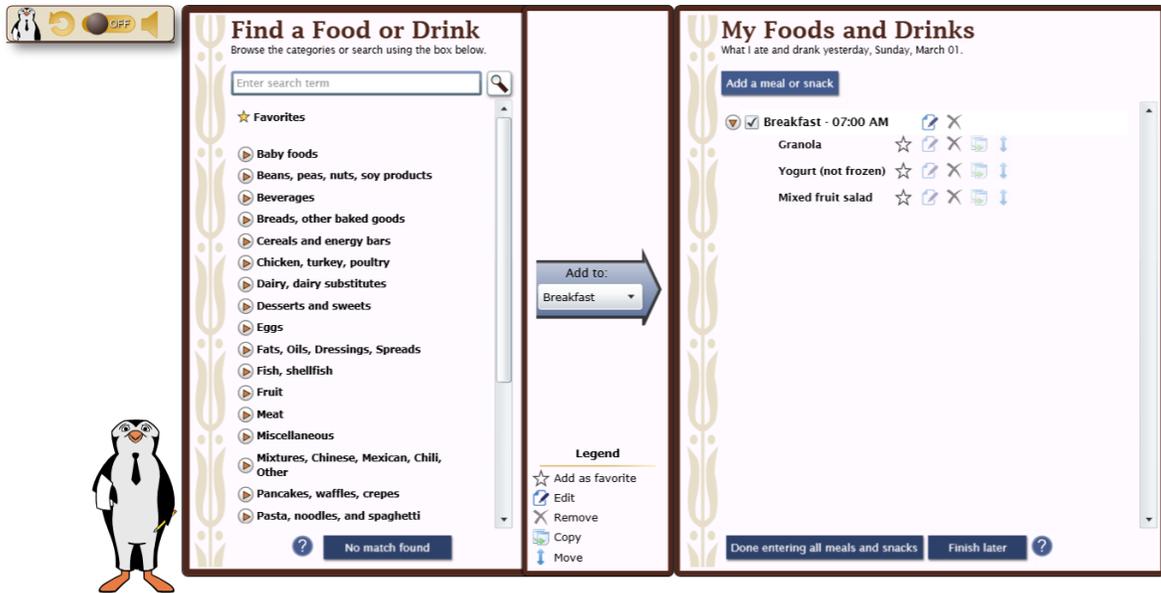
5. Screen Shot 5 – Foods not on the Pick List

   The respondent has entered a food that is not on the pick list. This screen shows how a food is written in.

6. Screen Shot 6 – the Completed Meals for the Day

This screen shows how the foods consumed during the day are entered as either a meal or a snack.

7. Screen Shot 8 – Queries to the Respondent

The respondent is queried about eating or drinking in periods of time in which the respondent did not report any foods or drinks.

8. Screen Shot 8 –Amount for Each Food

The respondent is asked to choose an amount for reach food or drink consumed.

9. Screen Shot 9 – Characteristics of the Food

The respondent is queried about the different characteristics of the food or drink he or she reports consuming.

10. Screen Shot 10 -- Further Details

The respondent is asked to report where he or she obtained the food or drink he or she reports.

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11. Screen Shot 11 – Supplements

The respondent is asked to report any supplements.
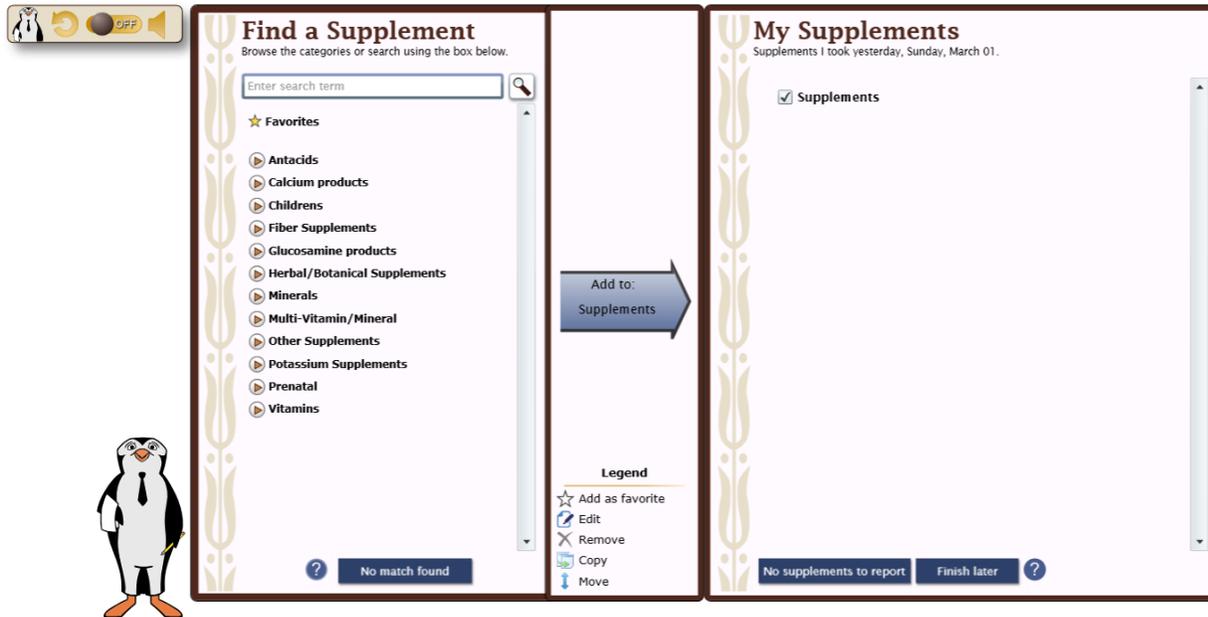
This page is intentionally blank

Dutch Time Use Survey

Translation of left-hand screen; Wednesday 10 July: Time & Activities: 04:00 Sleeping, 4:10 Breakfast, 04:20 Caring for and supervising children, 04:30 Paid work, 04:40 Study, course, 04:50 Gardening and animal care, 05:00 Visiting services, 05:10 Telephoning, 05:20 Completing smartphone diary. Buttons 'Menu' and 'Complete'. Translation of right-hand screen; Wednesday 10 July at 9:30, button 'Adjust' Your activity is: Caring for and supervising children (in your own household) + Travelling by public transport. You did this from 09:30 to 09:40. Were you alone or with someone you know? Alone: Yes / With children up to 9 years old: No / With other family members: No / With someone else you know: No. Buttons 'Menu', 'Copy previous activity' and 'Save'.
Source: SCP/CentERdata (STBO'11/'12-pilot)

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NCI Life in a Day

Figure 1a. Install Screen
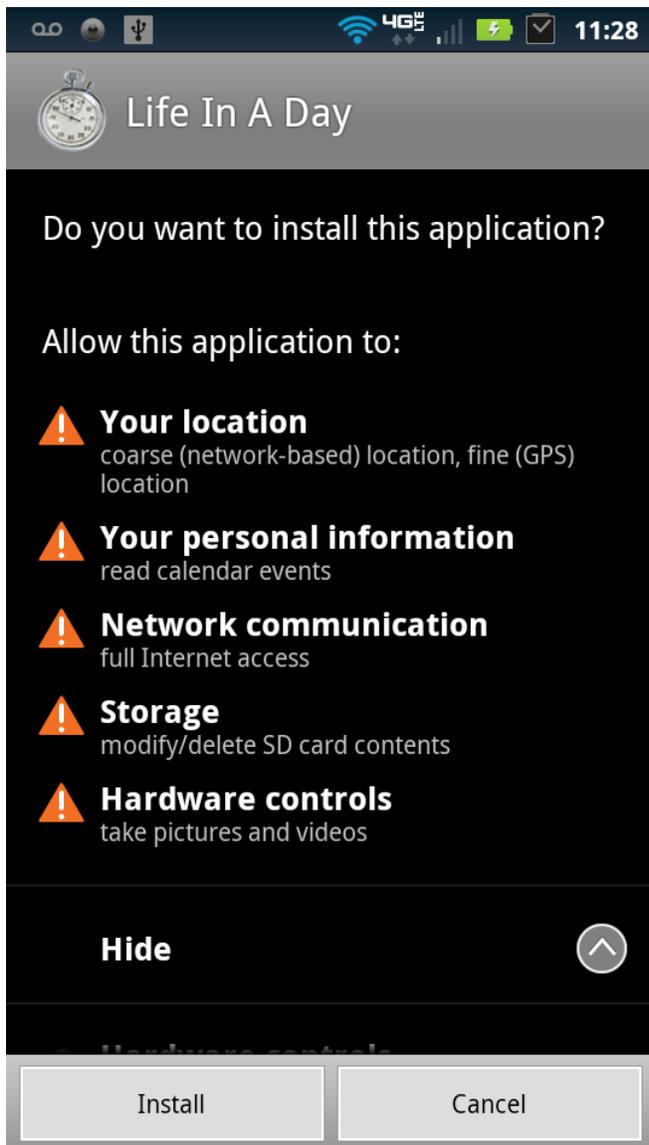
Figure 1b. Install Screen (Continued)
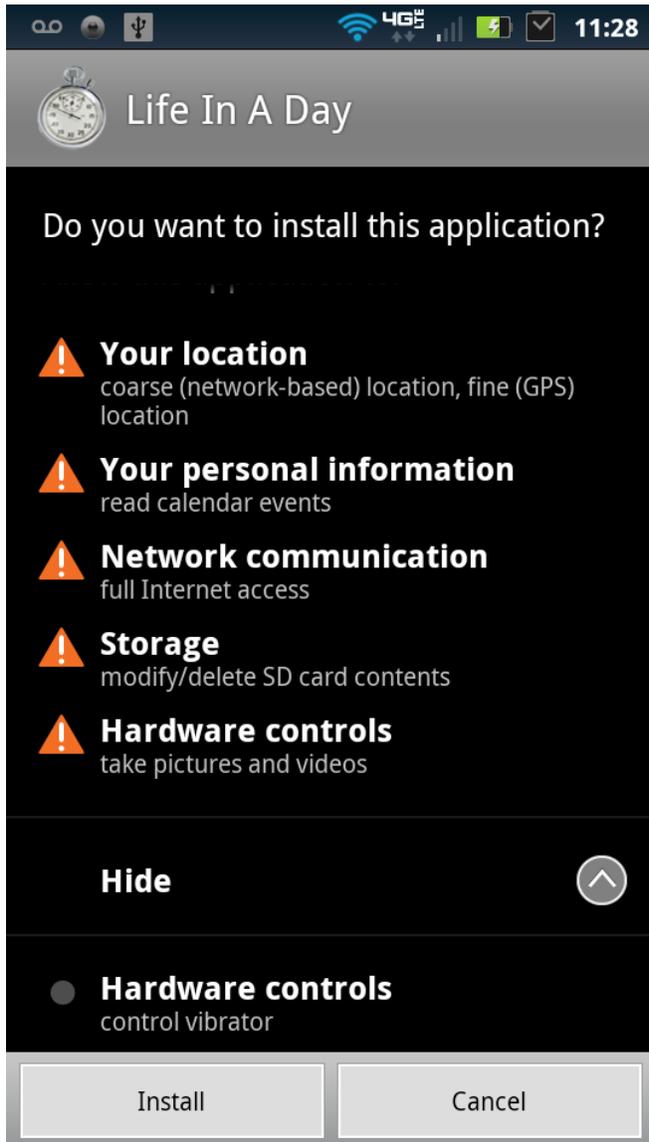
Description: scroll down screen to see full page

Figure 1c. Install Screen
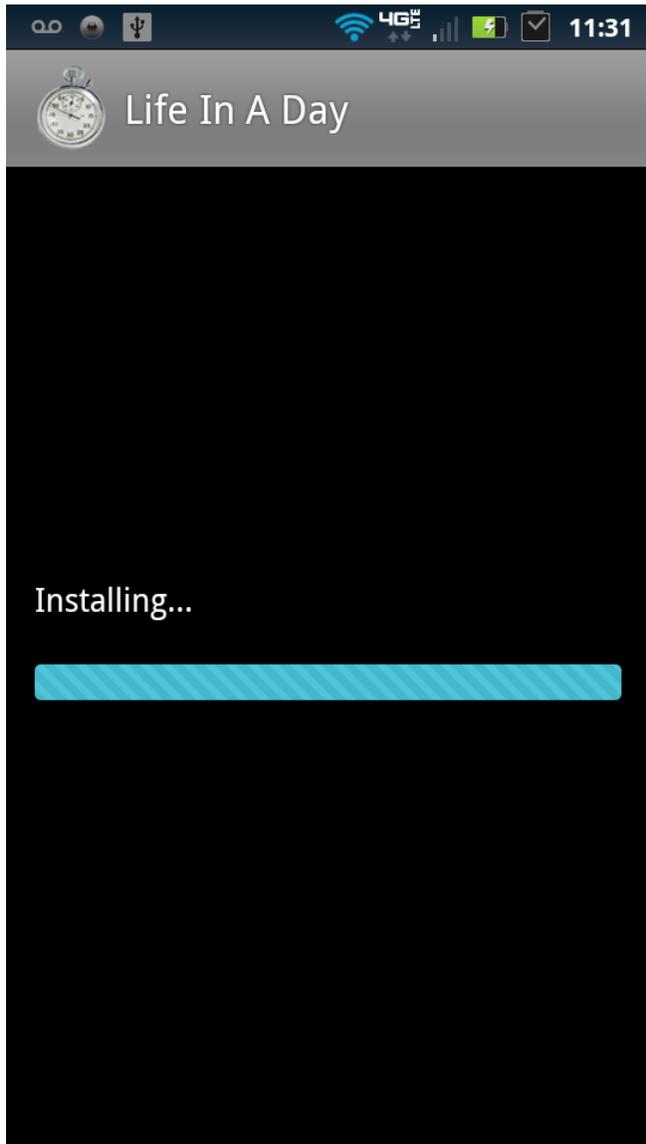
Figure 1d. Install Screen
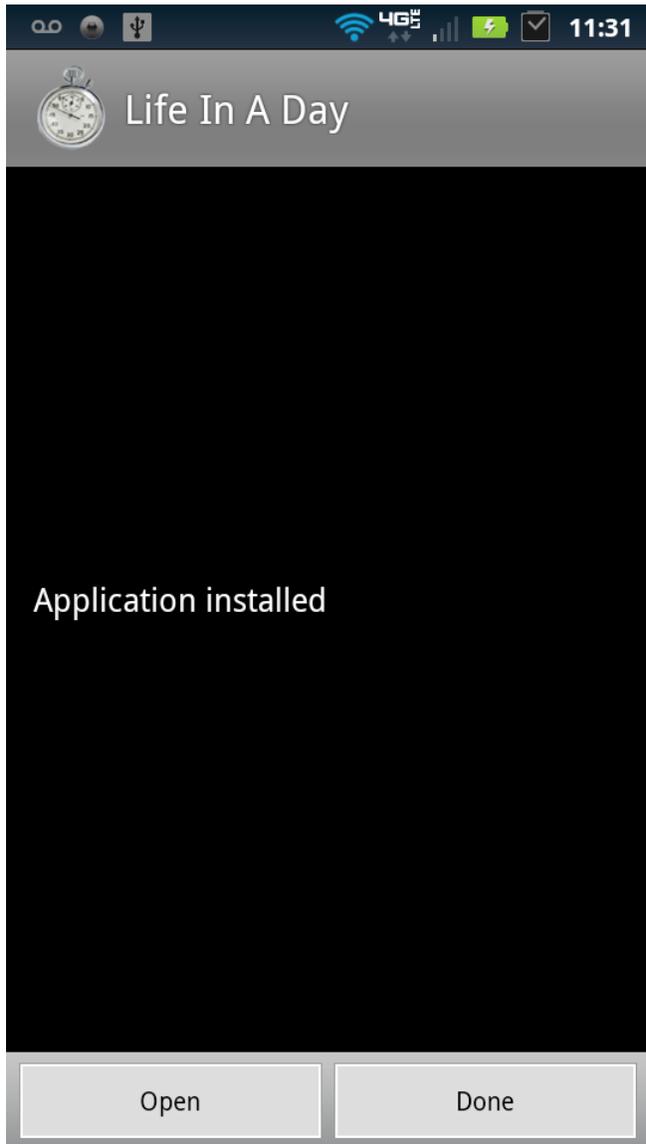
Figure 2. Application Splash Screen
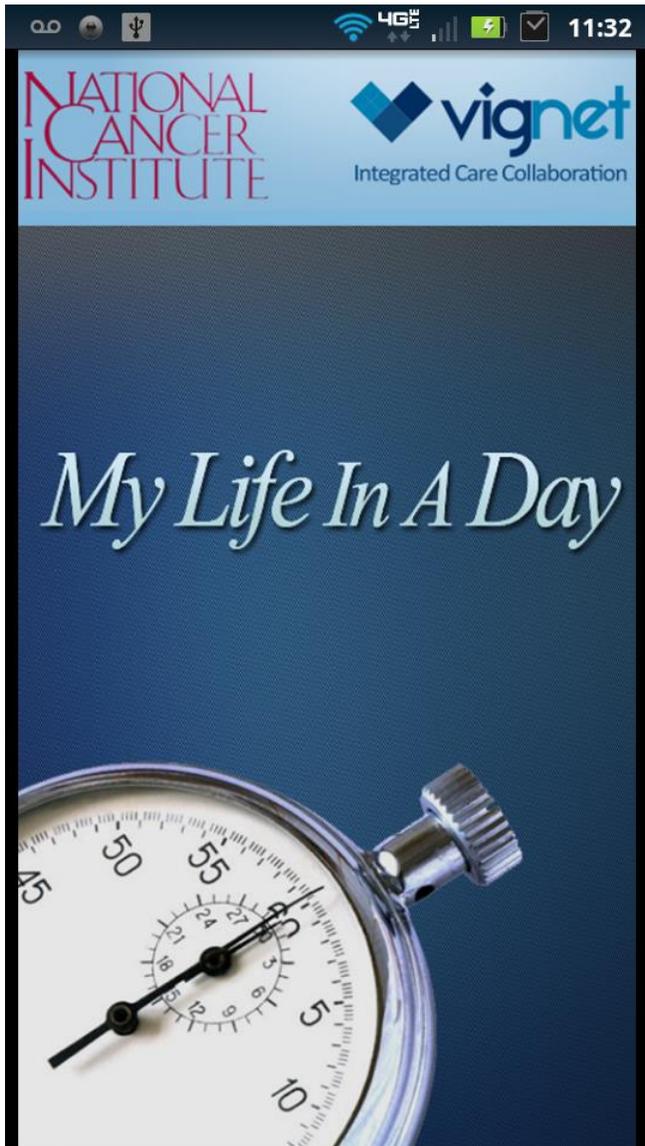
Figure 3a. Registration Screen

Description: On first open of application, the user is presented with a registration screen to capture a user profile.   First name, Last name, and Email are required fields.

Figure 3b. Registration Screen (Continued)

Description: Scroll down to few full list. Accepting terms of service is a required field

Figure 3c. Registration (Draft Terms of Service) Screen
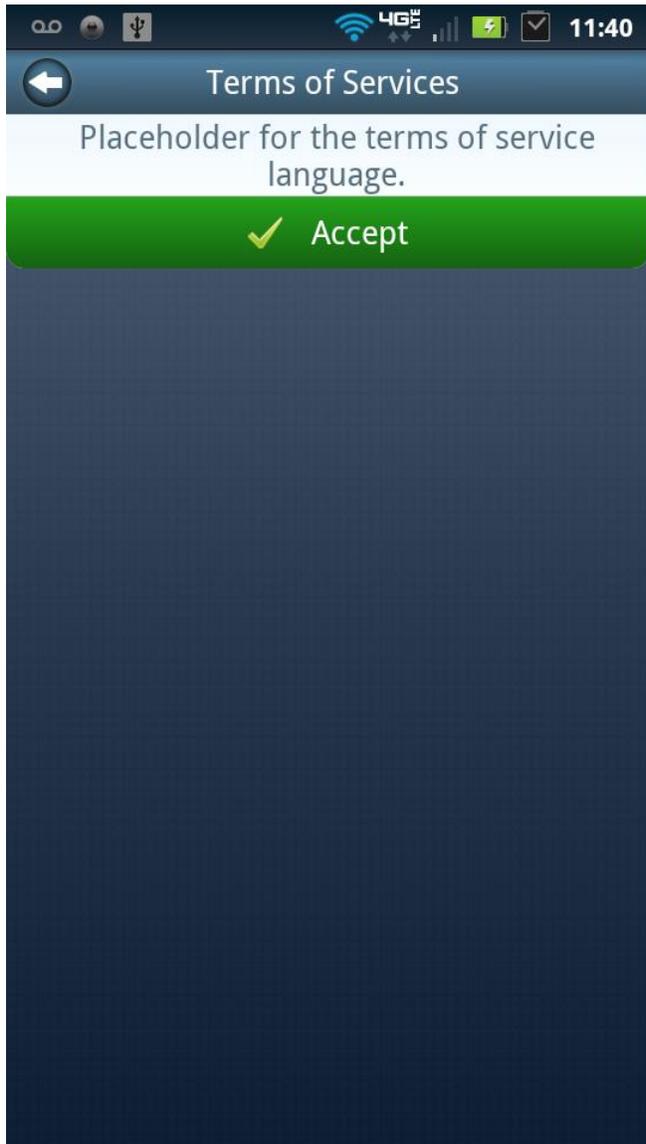
Description: Placeholder screen for future terms of service language.

Figure 4. First Time Application Launch Screen
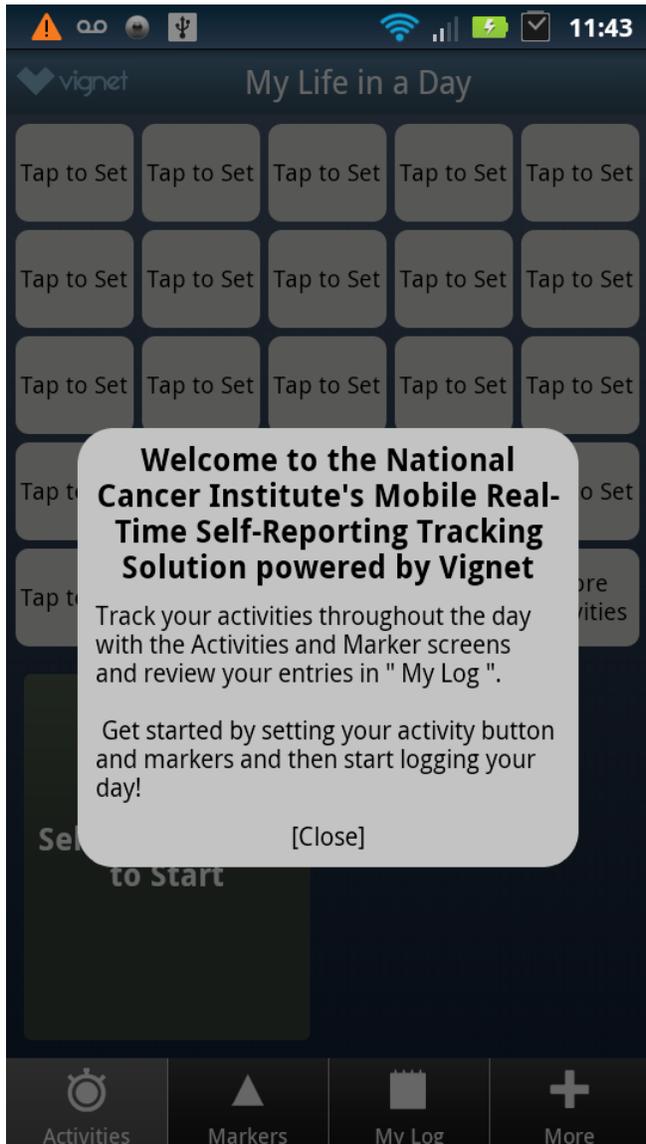
Description: Following user registration, the user is presented with the following initial instructions on first launch of the application

Figure 5. Default Activities Screen
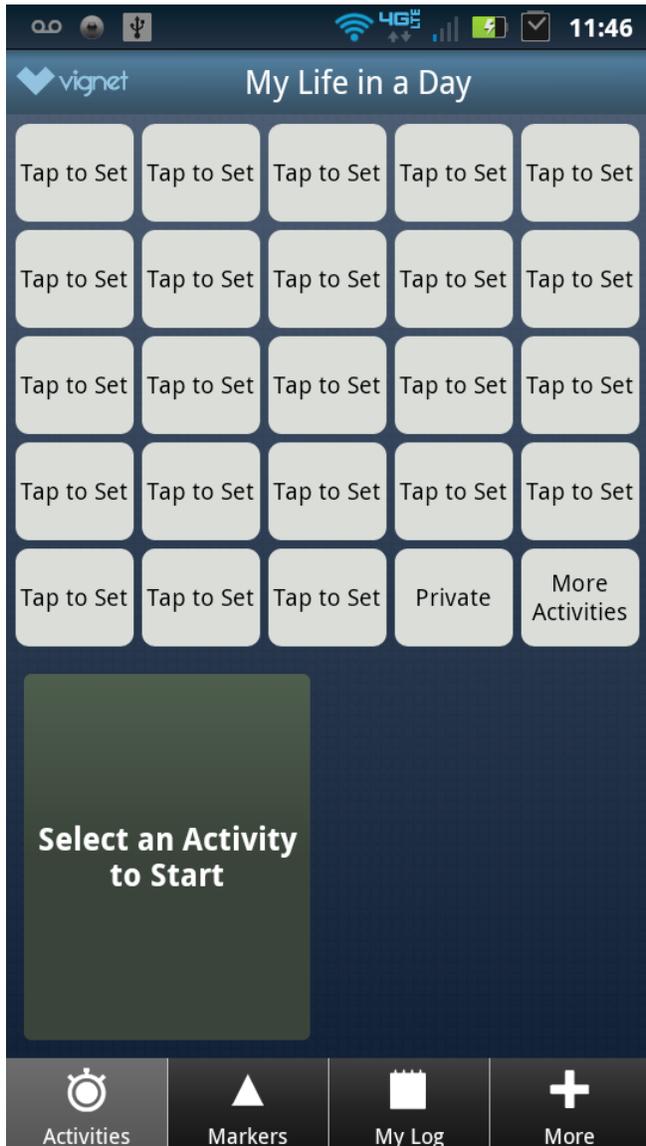
Description: Activities screen contains 23 user customizable activity buttons, one private button, and the more activities button for logging addition activities beyond the 23 present buttons.

Figure 6. Default Event Markers Screen

Description: The Markers screen allows the user to create and customize event buttons for logging discrete time events and contextual data.

Figure 7a. Daily Log Screen Zoom 1

Description: The My Log screen automatically logs activities and events for visualization, review, and editing. The user can zoom in and out using the arrow buttons on the top left of the screen.

Figure 7b. Daily Log Screen Zoom 2
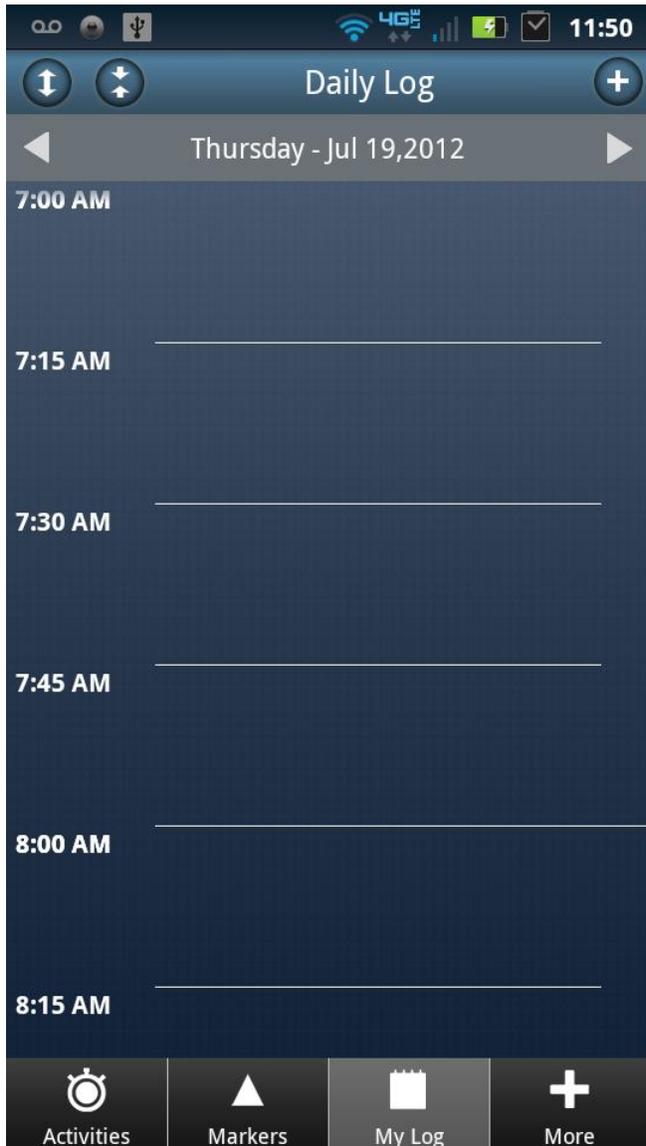
Description: Zoom 2 provides a closer view of daily activities for reviewing or editing of short duration activities or events

Figure 7c. Daily Log Screen Zoom 3
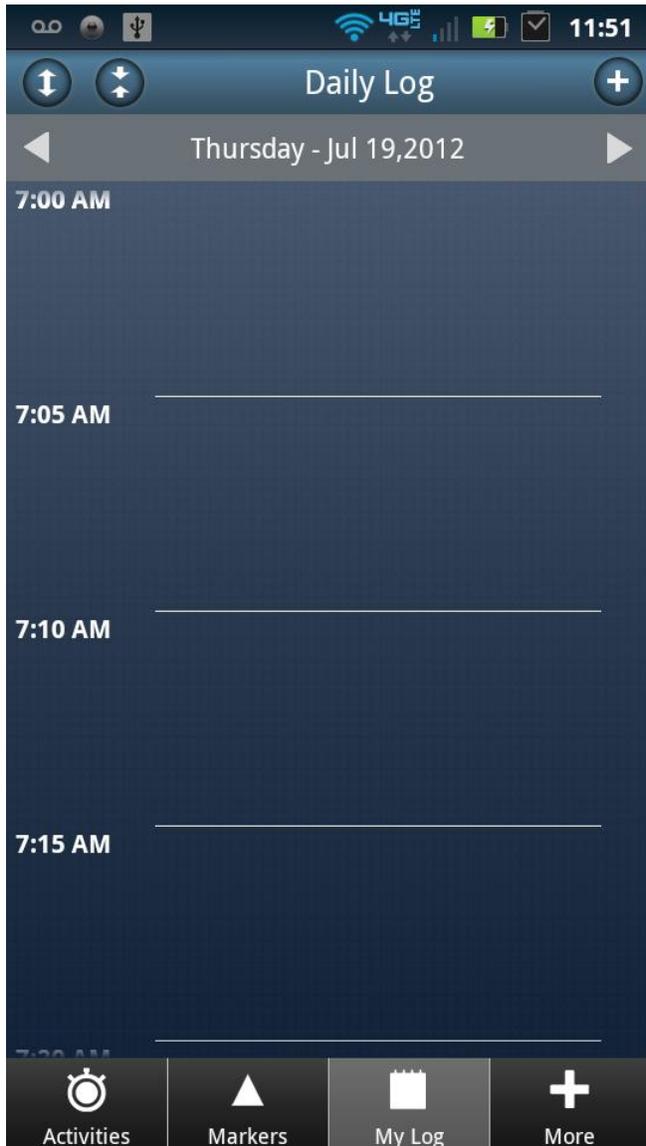
Description: Zoom 3 provides a closer view of daily activities for reviewing or editing of short duration activities or events

Figure 8a. More Menu Screen
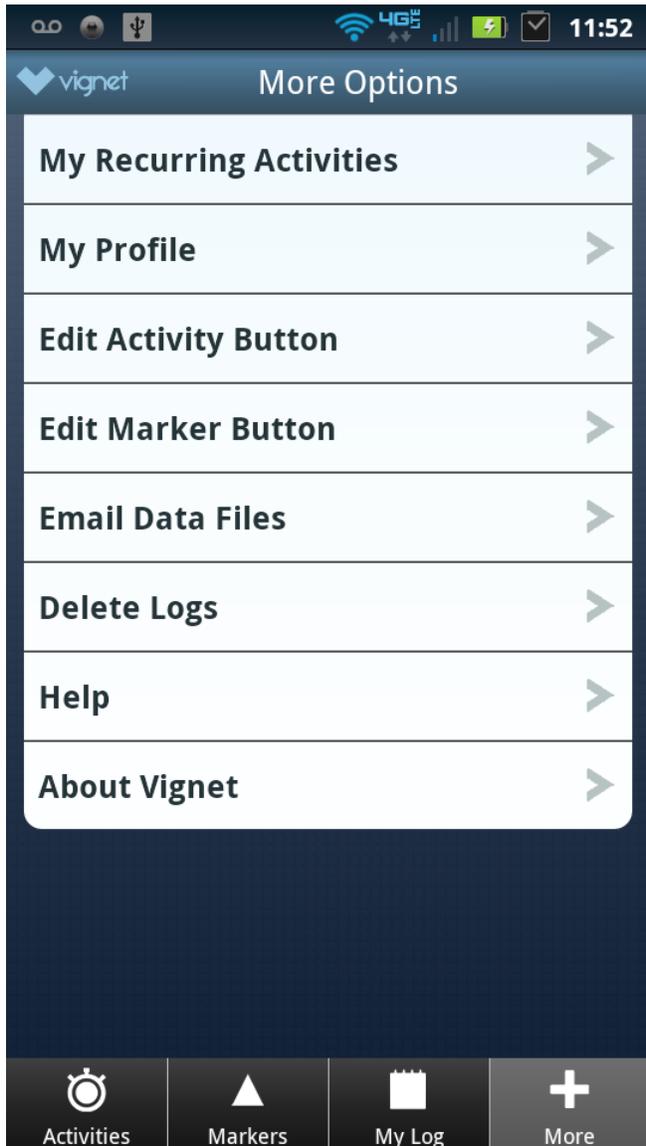
Description: The more menu provides an additional features, options, and information for the Life in a Day application.

Figure 8b. More Menu Recurring Activities Screen

Description: Recurring activities can be set during the initialization process, and can be edited at any time using the recurring activities tab on the more menu.

Figure 8c. More Menu My Profile Screen
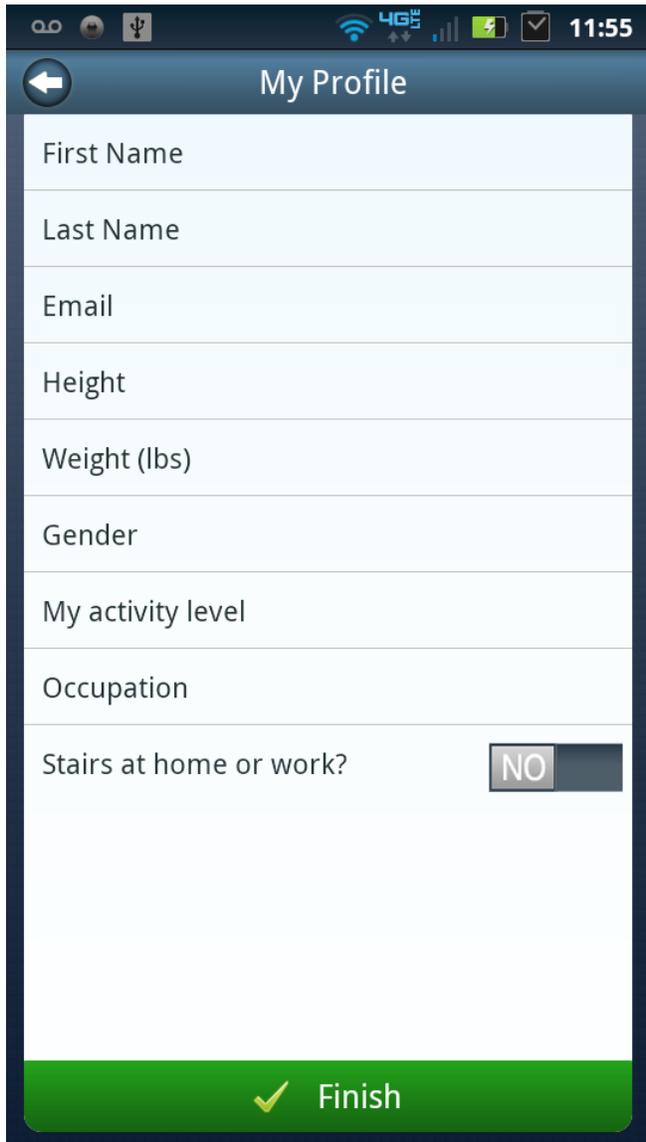
Description: The users profile can be set during the initialization process, and can be edited at any time using the My Profile tab on the more menu.

Figure 8d. More Menu Edit Activity Buttons Screen
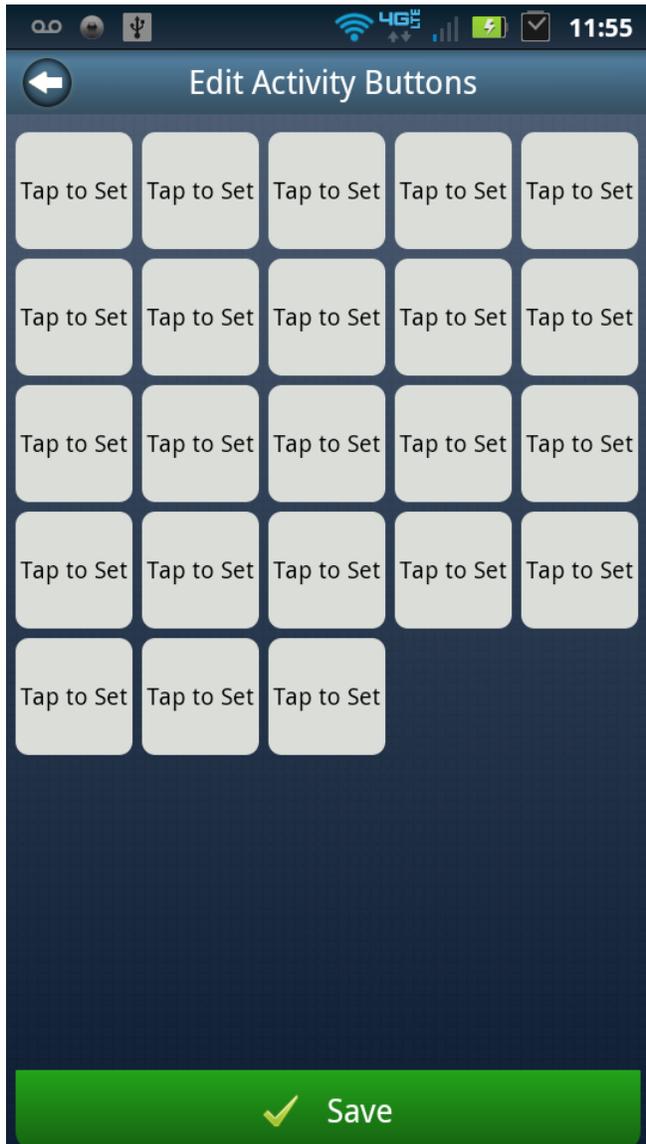
Description: User customized activity buttons and be edited, deleted, or reorganized using the Edit Activity Buttons tab on the more menu.

Figure 8e. More Menu Edit Marker Buttons Screen
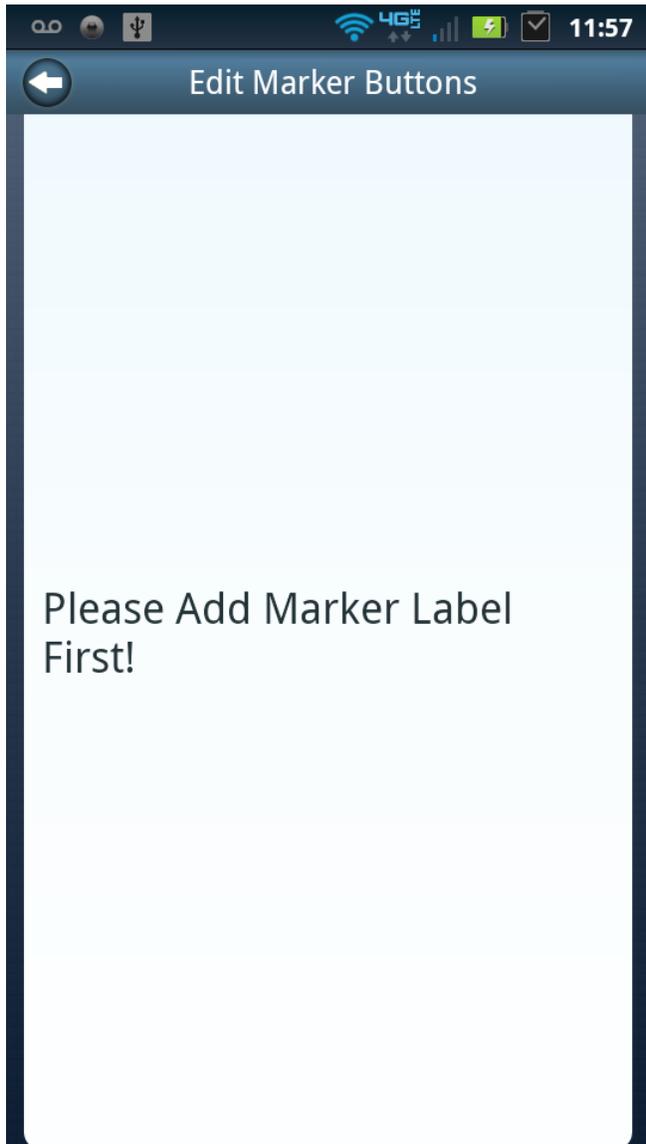
Description: User customized Marker buttons and be edited, deleted, or reorganized using the Edit Marker Buttons tab on the more menu.

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Figure 8f. More Menu Email Data Logs (Sample) Screen
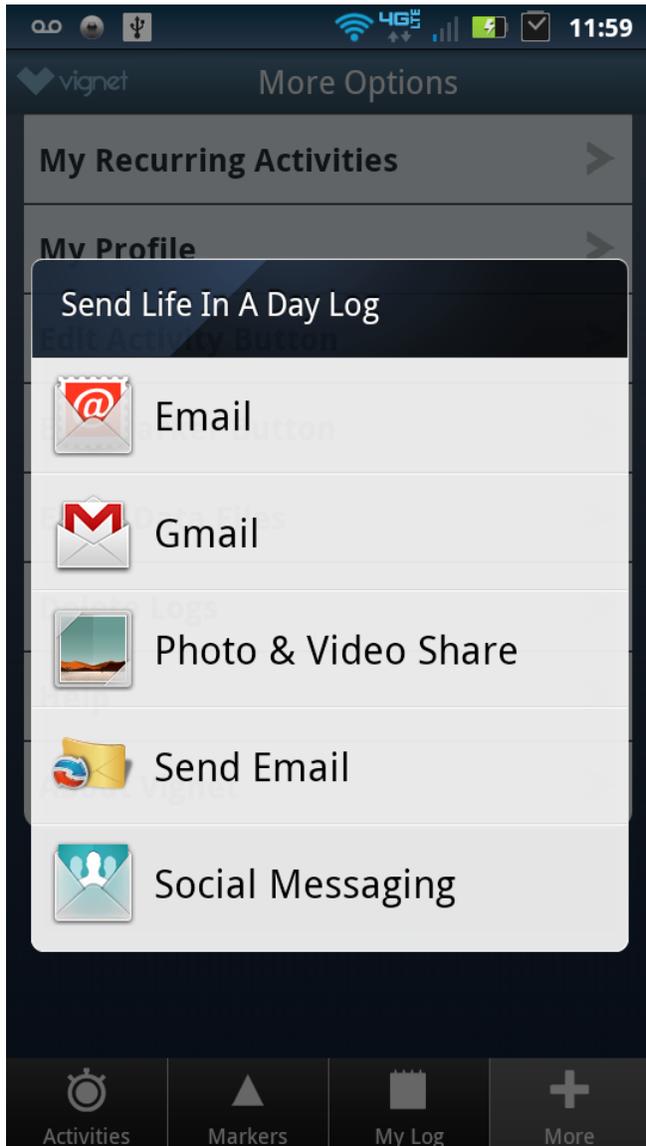
Description: Life in a Day data files (currently stored in CSV format on the phones SD card) can be emailed using the Email Data Logs tab on the more menu. Available email accounts and sharing options well vary by phone based on user installed applications.

Figure 8g. More Menu Delete Logs Screen
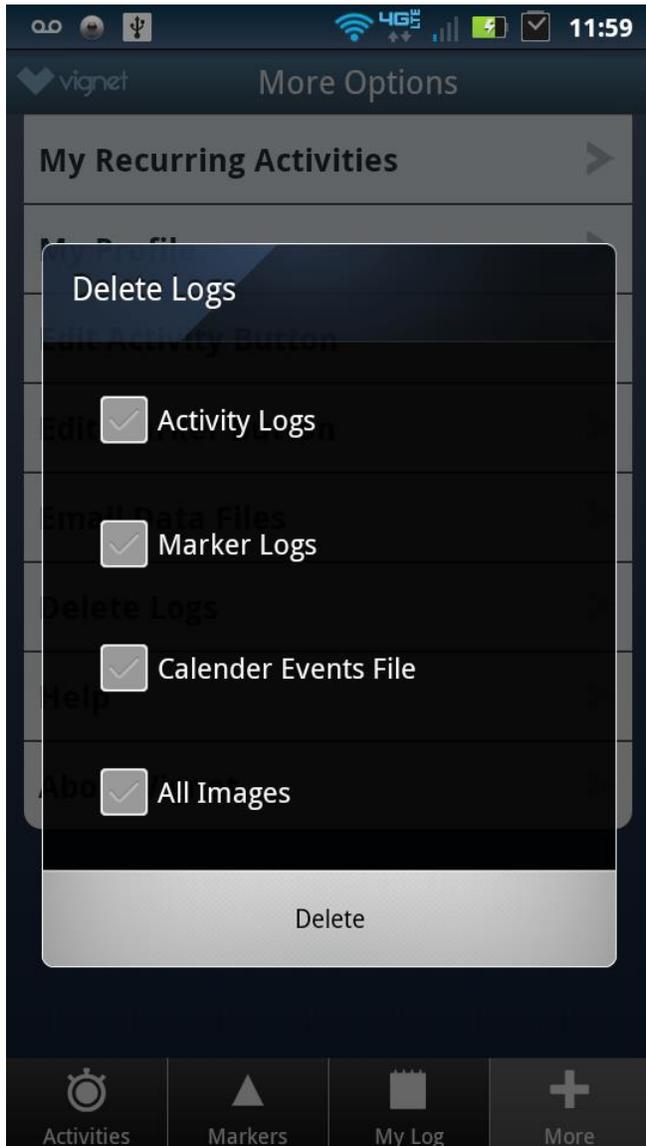
Description: Users can delete all existing data files, or selected file types, stored on the phones SD card using the Delete Logs Screen on the more menu.

Figure 8h. More Menu About Vignet Screen

Description: Information about the Developer of Life in a Day is provided in the About Vignet tab on the more menu.

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Figure 9a. Customize Activity Button Workflow Screen 1
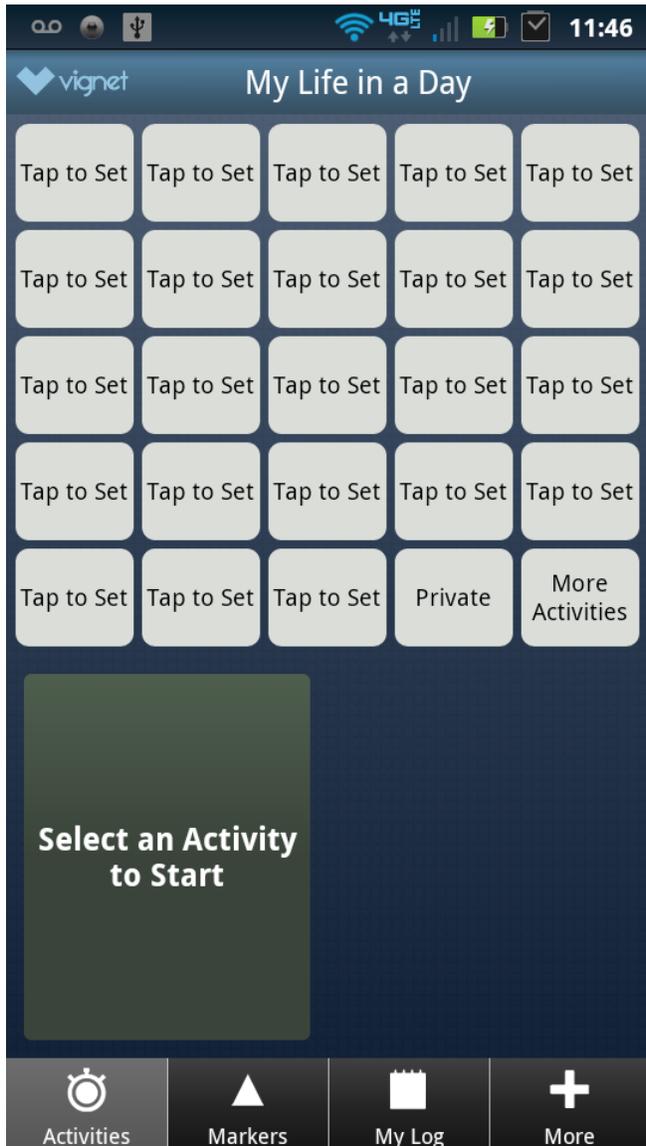
Description: To customize an activity button, the user begins from the Activities screen and taps on any button which displays "Tap to Set".

Figure 9b. Customize Activity Button Workflow Screen 2
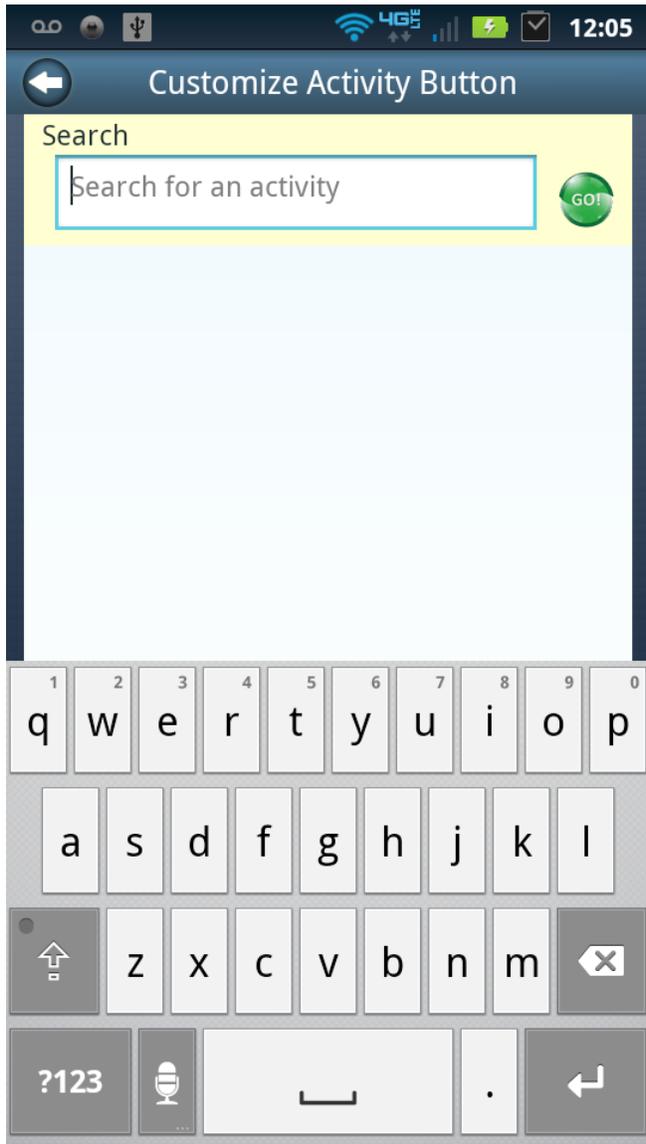
Description: The user is presented with a search screen and can type in search terms to select specific activities.

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Figure 9c. Customize Activity Button Workflow Screen 3
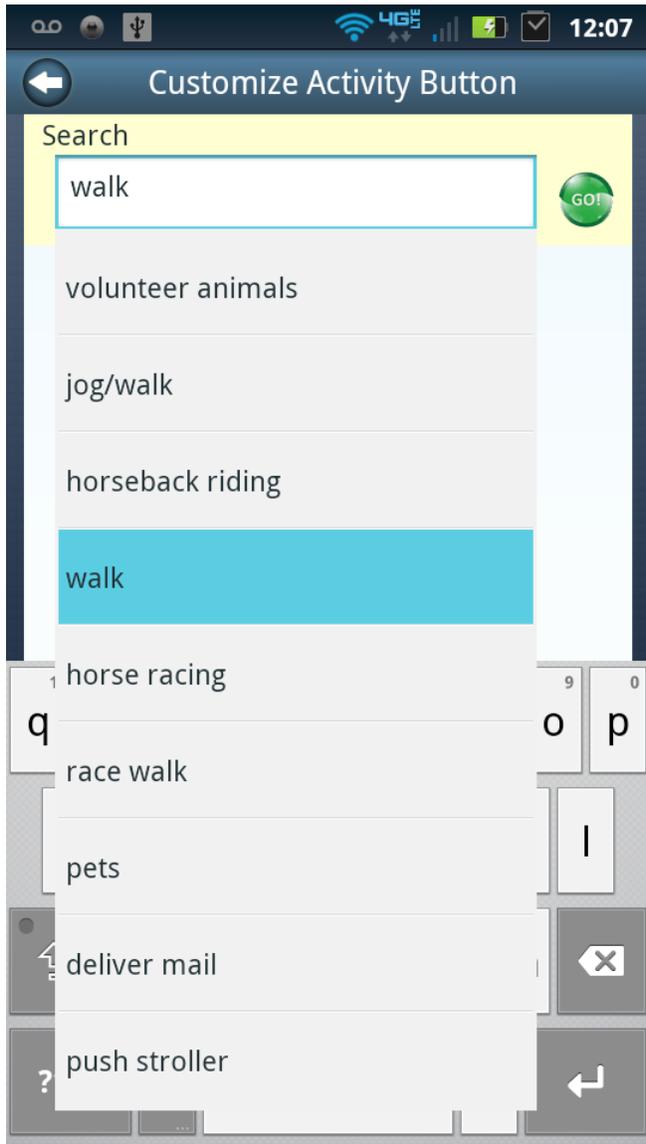
Description: The search term is queried against a keywords list and matching activity descriptions are displayed. The user can select from the list or select "I didn't find what was looking for" and create a new activity. After selecting an activity push the green GO button.
Figure 9d. Customize Activity Button Workflow Screen 4
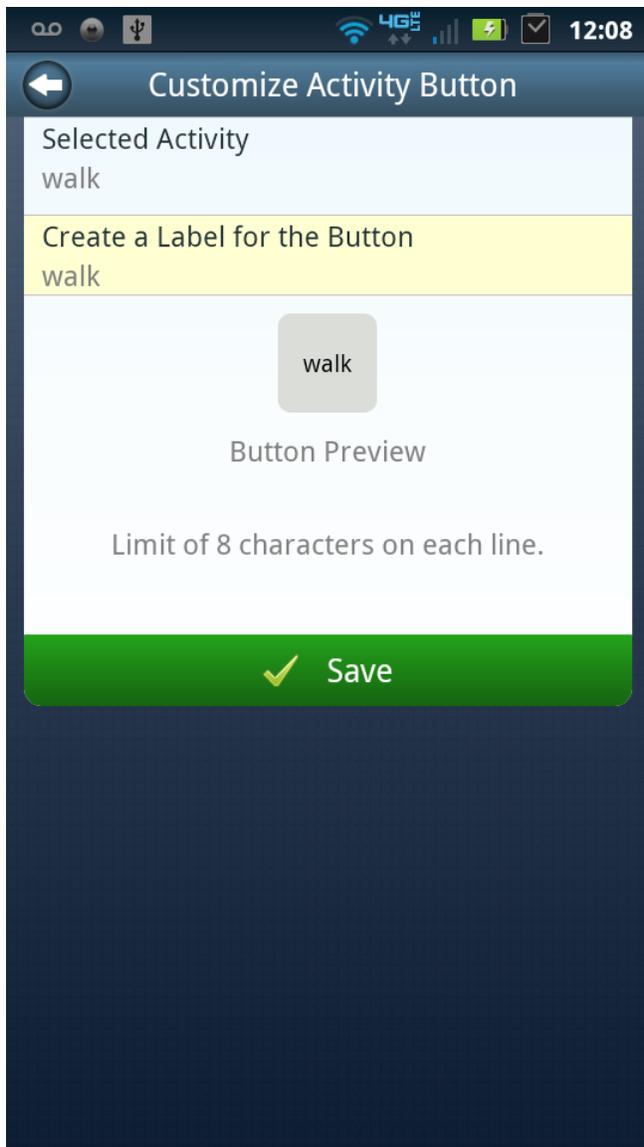
Description: Once a user selects an activity from the presented descriptions they will preview the button with a default button label for the selected activity. The user can modify the button label by tapping the yellow tab. This does not alter the underlying activity.

Figure 9e. Customize Activity Button Workflow Screen 5
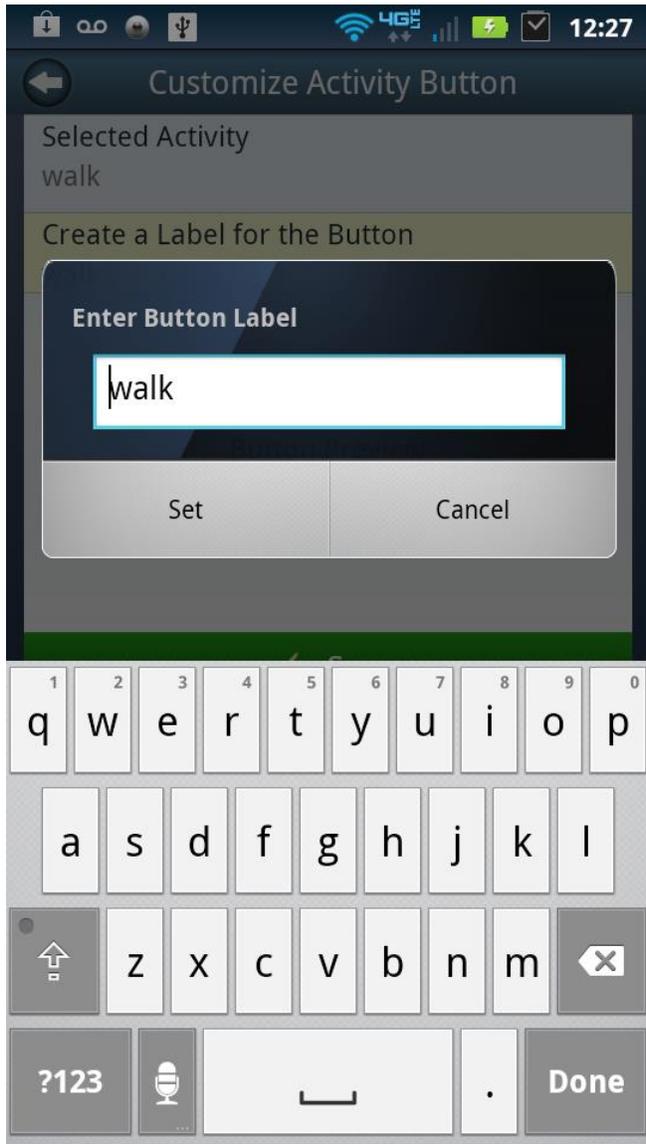
Description: Sample of editing feature for activity buttons.

Figure 9f. Customize Activity Button Workflow Screen 6
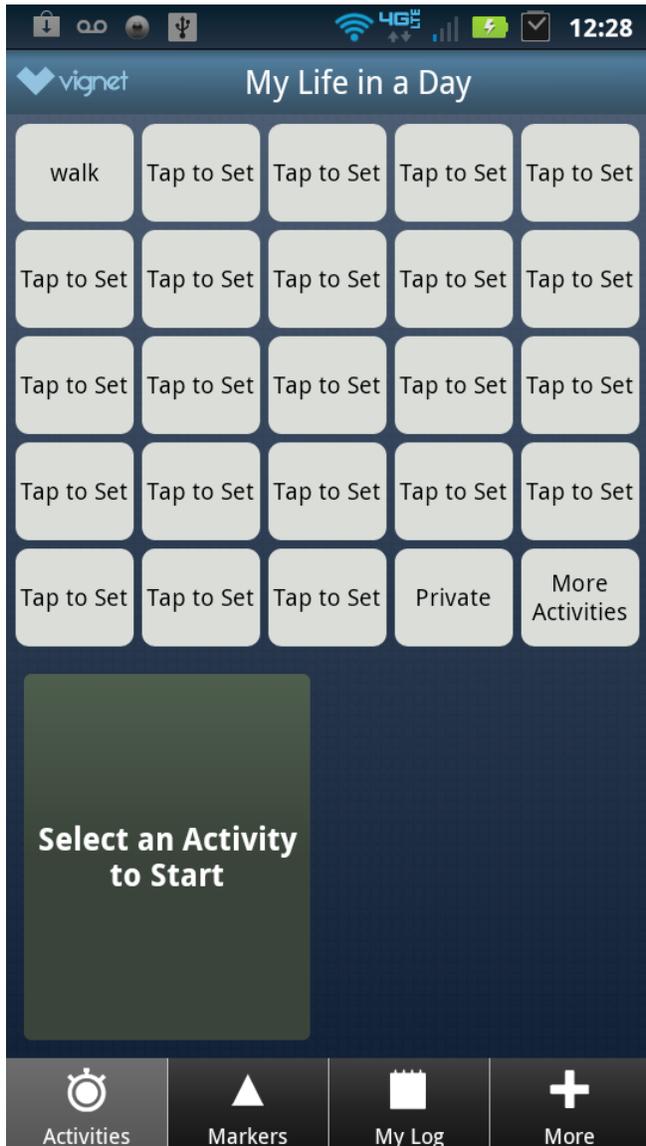
Description: After the users presses the green Save tab (see figure 9d) the customized button label is assigned to the Activities screen.

Figure 10a. Customize Marker Button Workflow Screen 1

Description: To customize a Marker button, the user begins from the Markers screen and taps on the button which displays "Tap to Add", in order to add additional buttons to the screen the user pressing the "Add Another Button" link.

Figure10b. Customize Marker Button Workflow Screen 2
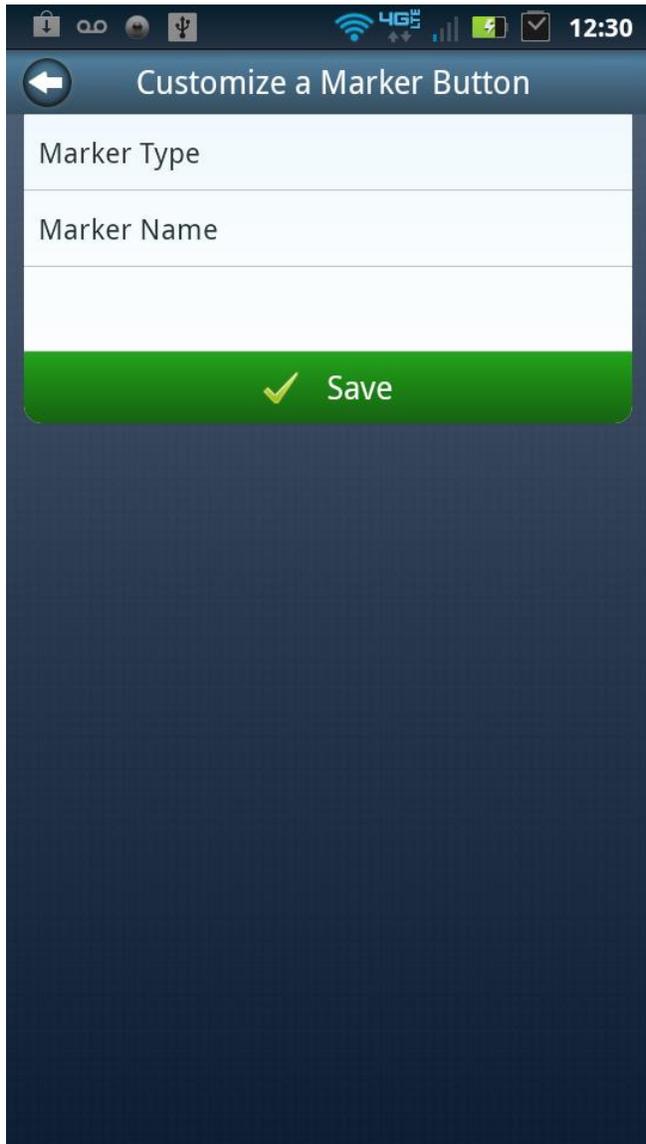
Description: Tapping on Marker Type allows the user to assign one of multiple Marker Categories to the new button.

Figure 10c. Customize Marker Button Workflow Screen 3
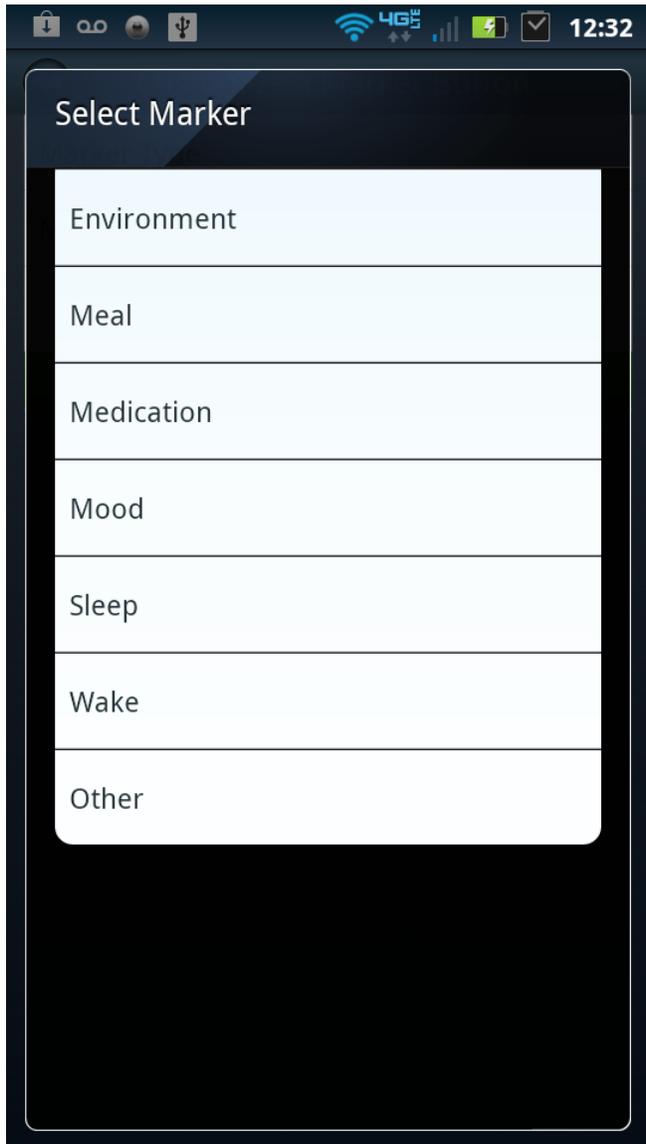
Description: The user can select the appropriate marker category for the new button from the list.

Figure10d. Customize Marker Button Workflow Screen 4
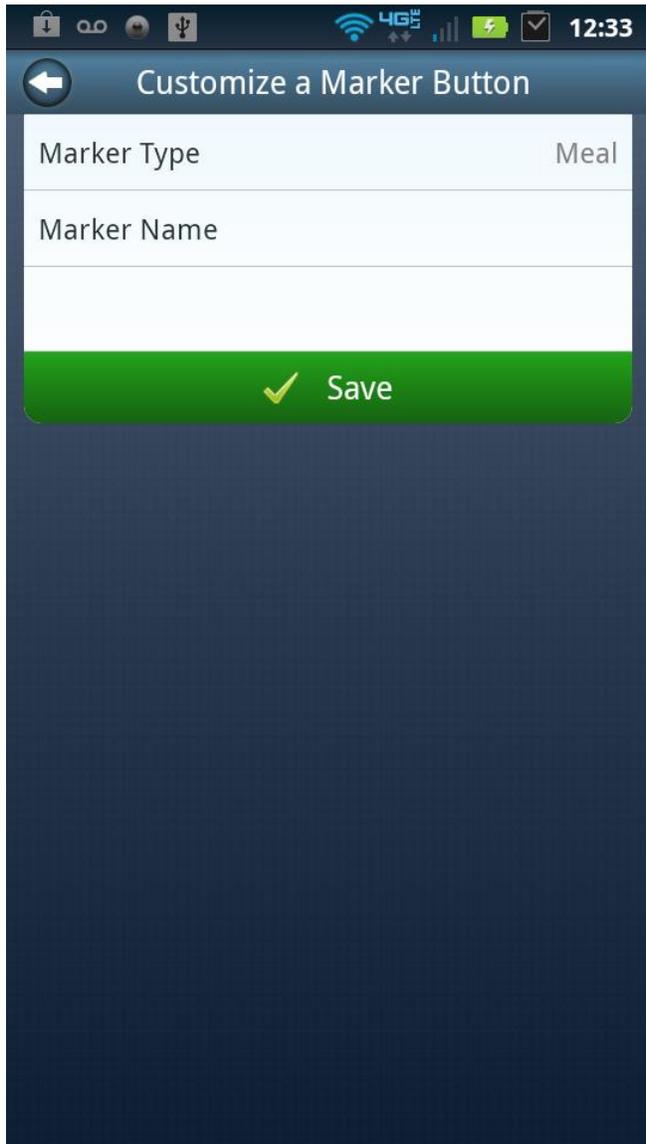
Description: Next the user can create the new button by tapping on the Marker Name tab.

Figure 10e. Customize Marker Button Workflow Screen 5
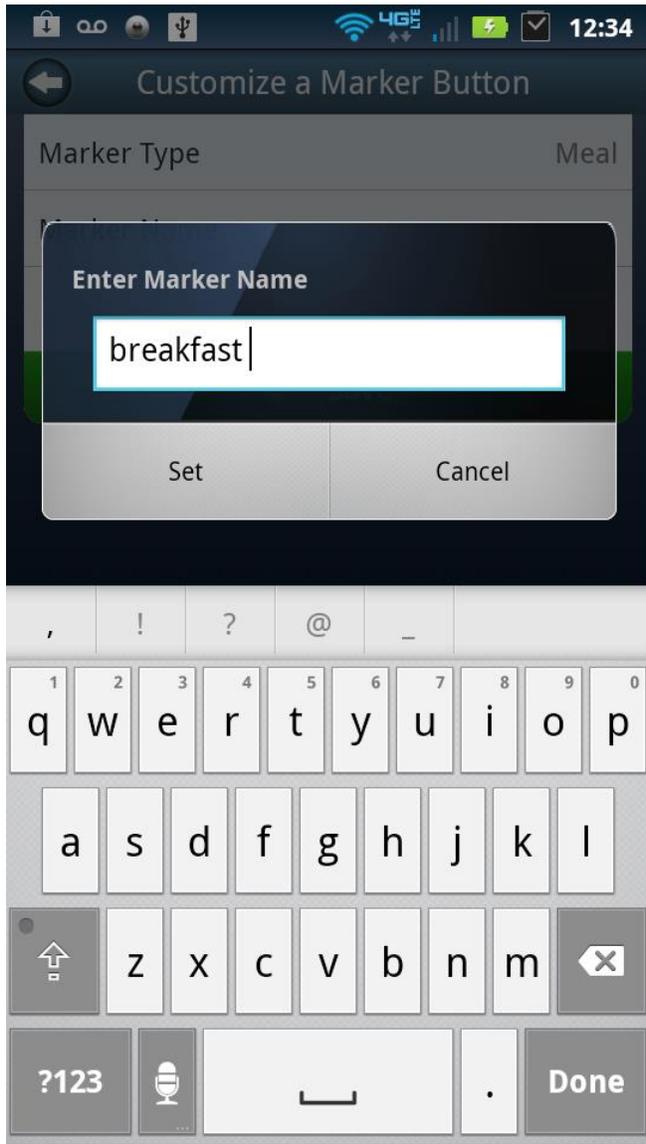
Description: The user types in the new marker button name.

Figure10f. Customize Marker Button Workflow Screen 6
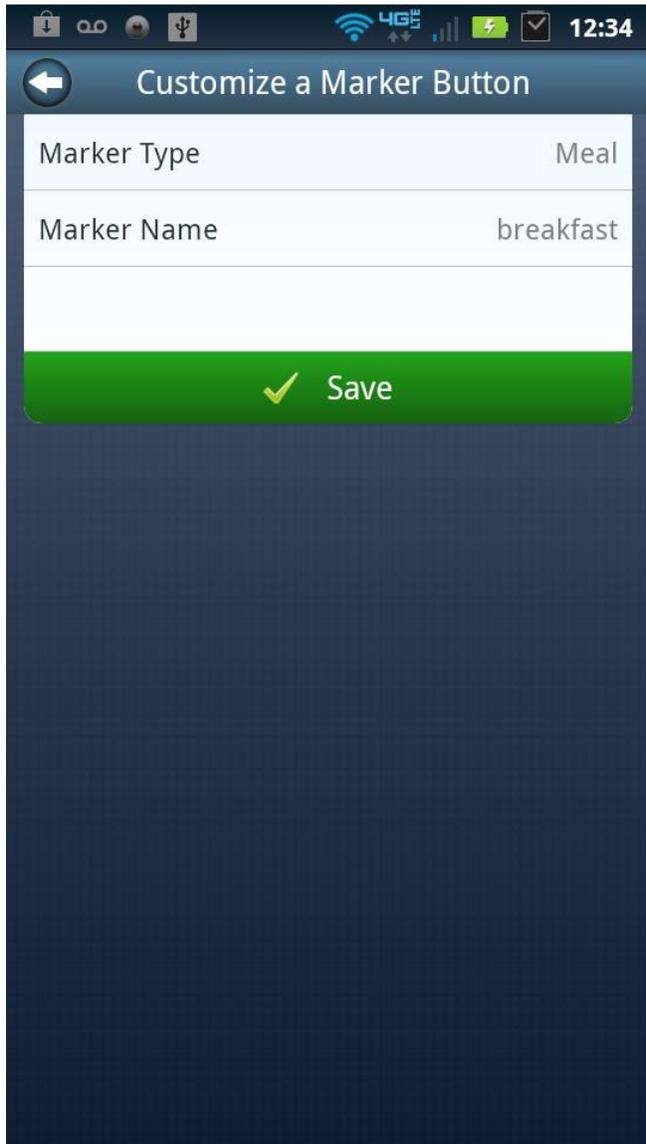
Description: The user can confirm and complete the new button by tapping on the green Save tab.

Figure 10g. Customize Marker Button Workflow Screen 7

Description: New button is displayed on the screen, in order to create more button the user must select add another button. A total of 30 marker buttons can be displayed.

Figure11a. Activities Logging Workflow Screen 1
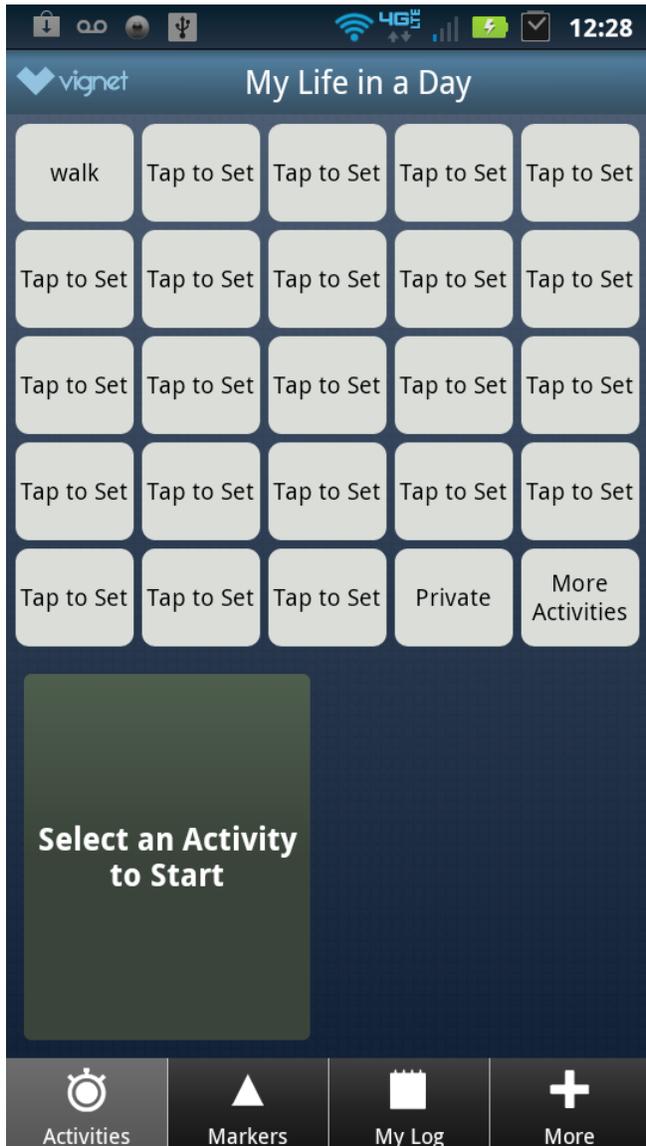
Description: In order to log activities using the real time diary feature, the user taps an assigned activity button or uses the More Activities button for items not assigned to customized button.

Figure11b. Activities Logging Workflow Screen 2
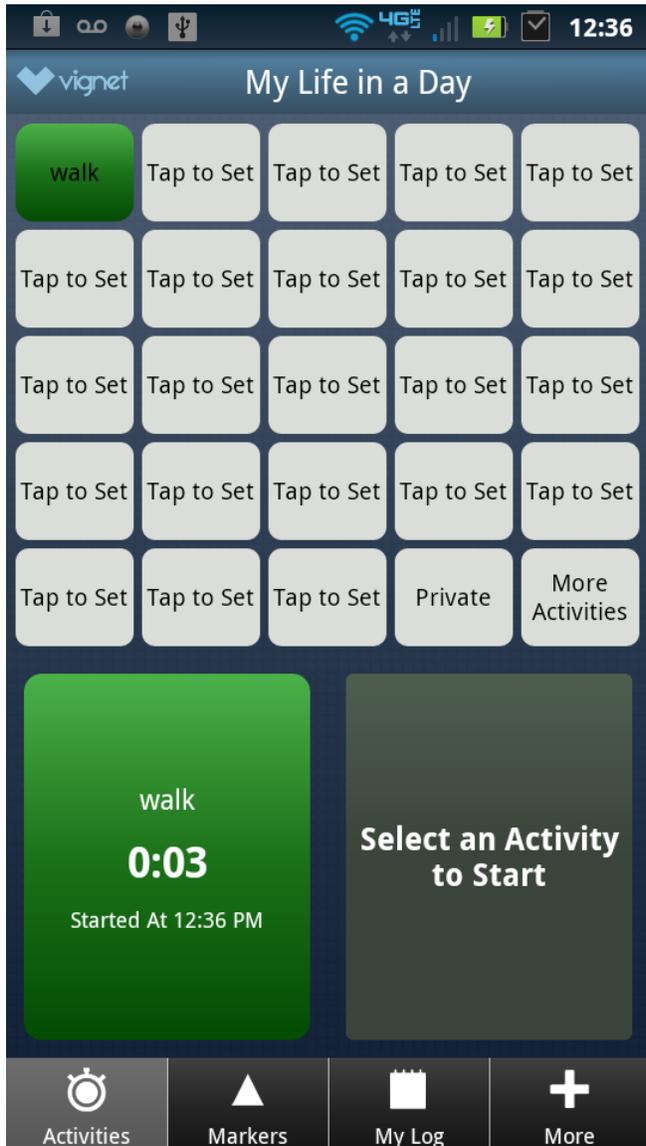
Description: Once the customized button is tapped, the stopwatch begins to log time for that activity and captures the start time. Two activities can be selected to record concurrent activities. Tap the timer or the activity button to stop and record an activity.

Figure11c. Activities Logging Workflow Screen 3
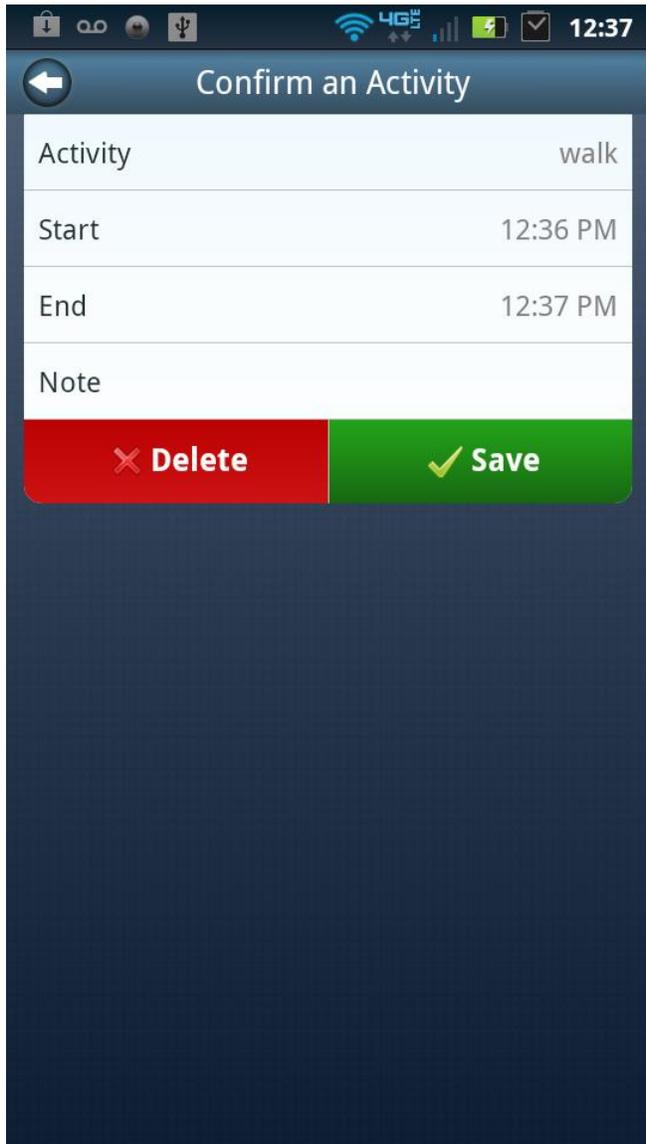
Description: The user can confirm the start and end times of an event, edit times by pressing the appropriate time tab, delete, or save the activity.

Figure12a. Event Marker Logging Workflow Screen 1

Description: In order to log events using the real time diary feature, the user taps an assigned event marker button.

Figure12b. Event Marker Logging Workflow Screen 2
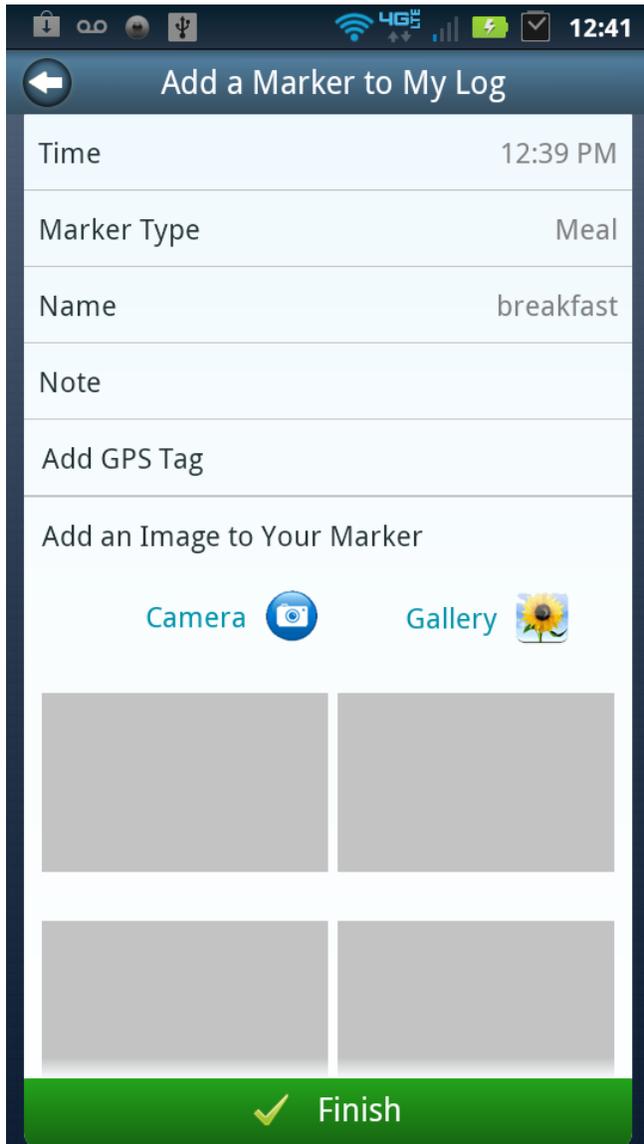
Description: The event is time-stamped and the assigned marker type and event name are displayed. In addition the user can add text based notes, tag the event with current GPS coordinates, and tag with images using the phone camera or gallery pictures.

Figure12c. Event Marker Logging Workflow Screen 3
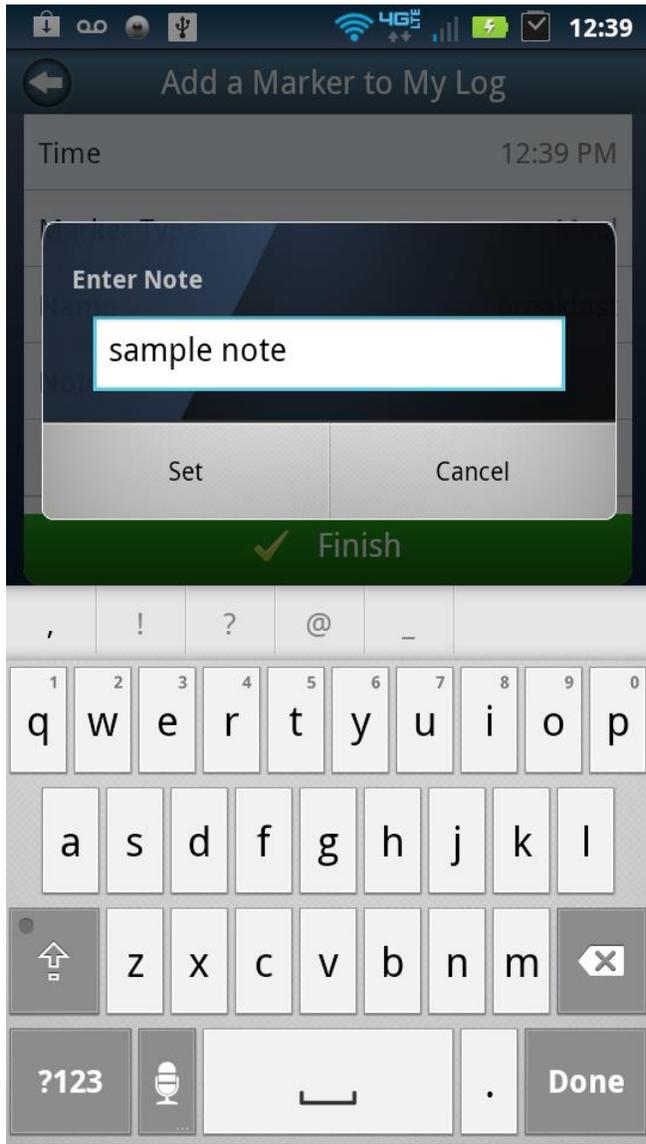
Description: Data entry screen for adding text based notes to an event marker.

Figure12d. Event Marker Logging Workflow Screen 4
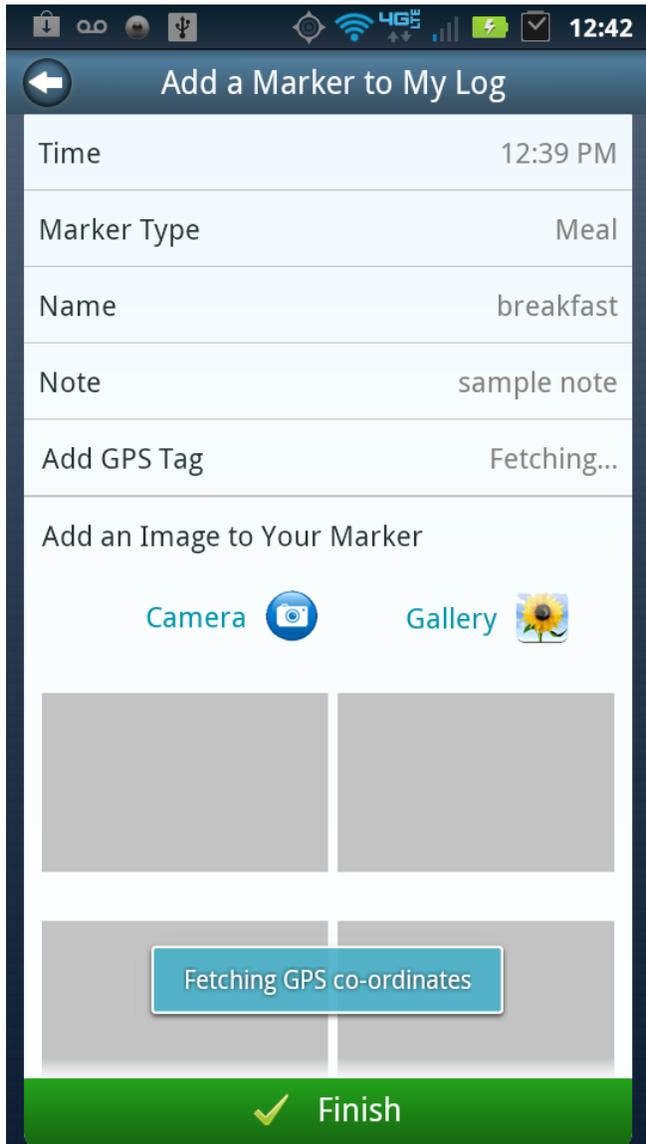
Description: When the user taps on Add GPS Tag the phones GPS radio will fetch current GPS co-ordinates.

Figure12e. Event Marker Logging Workflow Screen 5
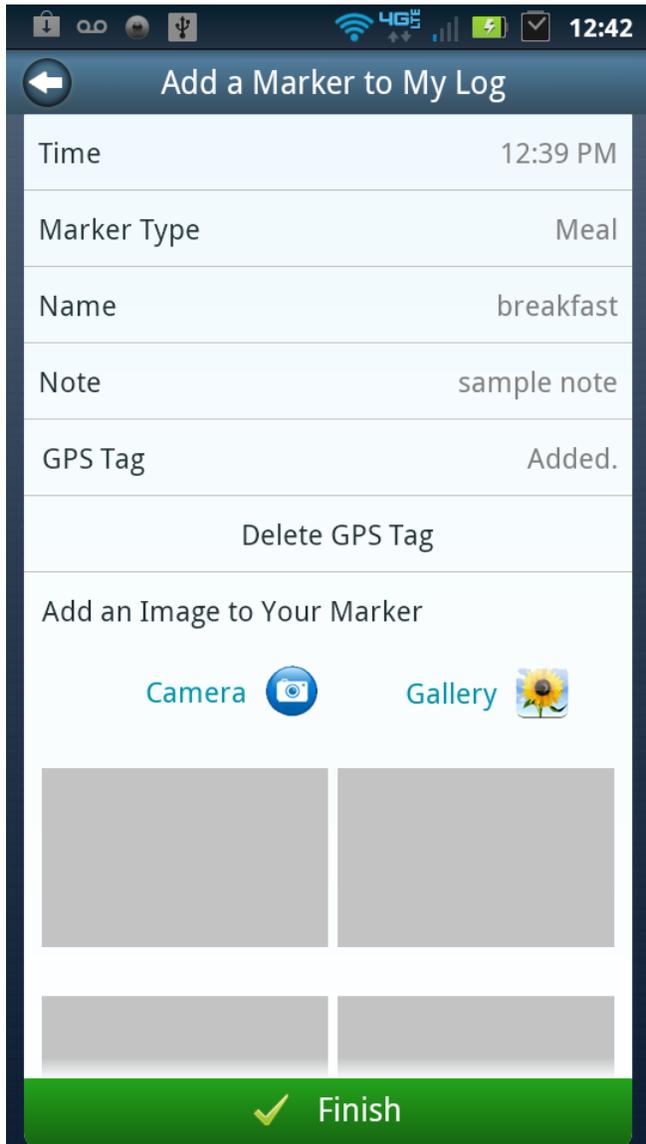
Description: Once a GPS tag has been added it the screen will display GPS Tag status as Added. The user can delete the GPS tag from the event record in the database using the Delete GPS Tag tab. When complete, the user taps the green button finished button.

Figure13a. Daily Log Review Workflow Screen 1
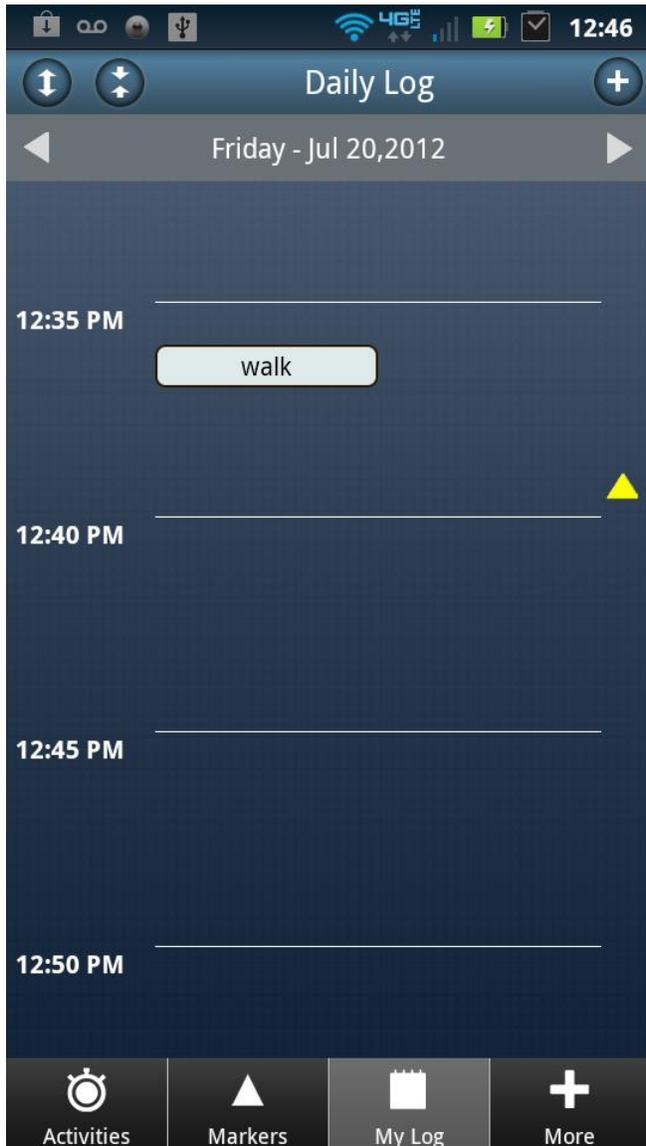
Description: Users can view and edit activities and events from the daily log view, activities are displayed as a time blocks based on start/end times and events are displayed as yellow triangles based on the time recorded. To edit the user taps the block or triangle.

Figure13b. Daily Log Review Workflow Screen 2
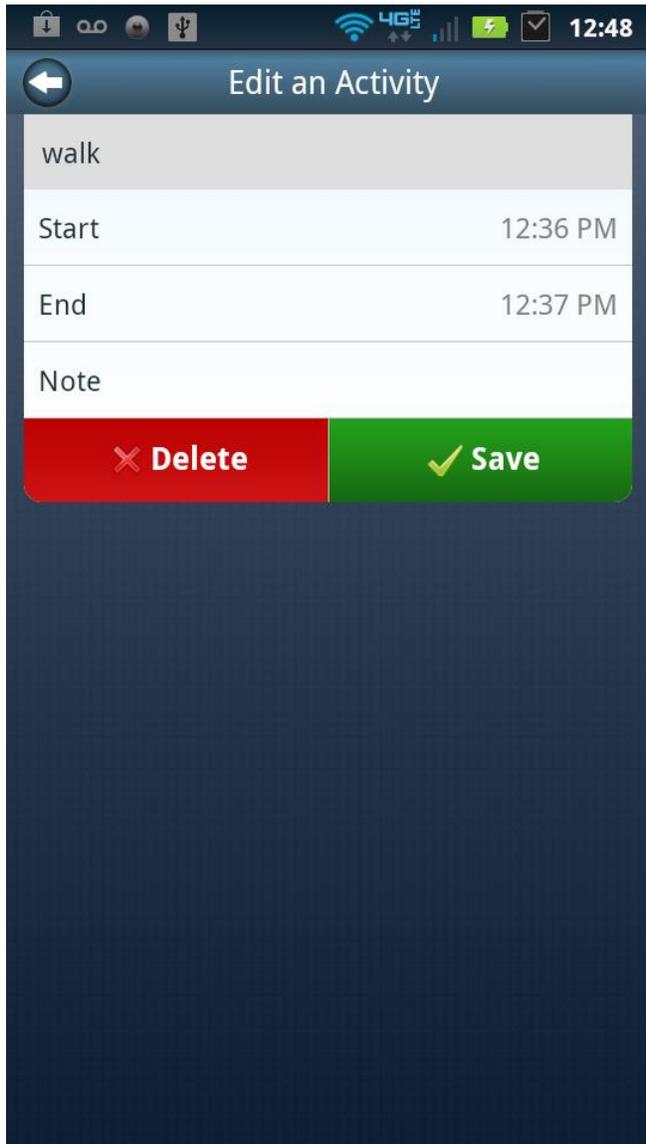
Description: Start and end times for logged activities can be modified and each activity can be deleted or resaved.

Figure13c. Daily Log Review Workflow Screen 3
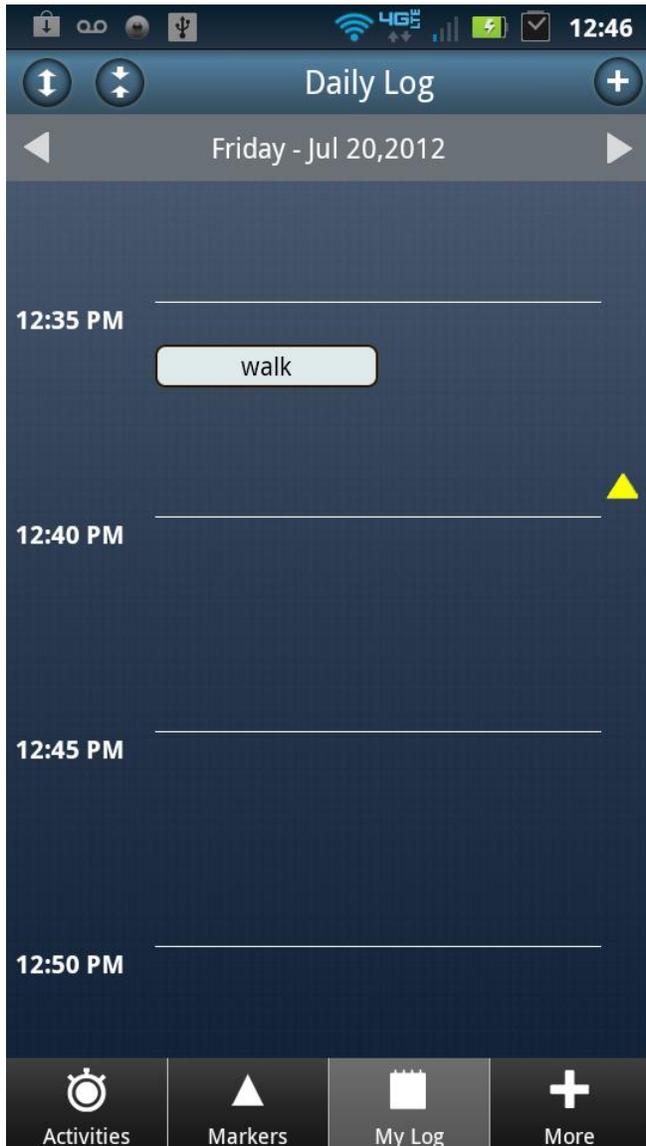
Description: Tap the yellow triangle to view/edit an event marker.

Figure13d. Daily Log Review Workflow Screen 4
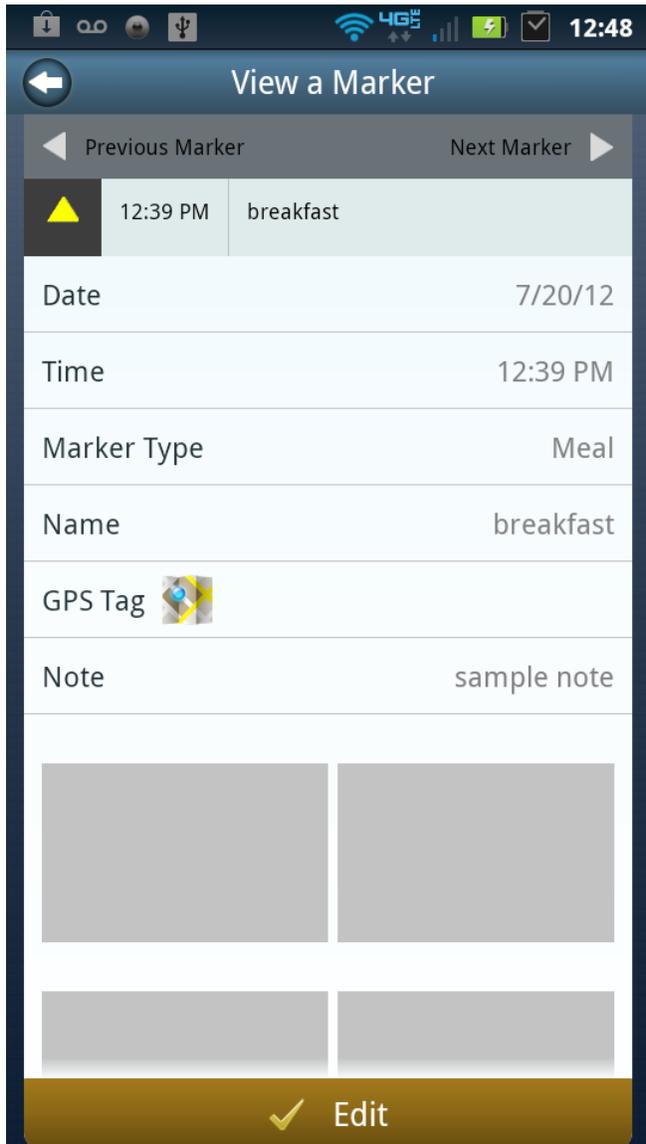
Description: Event markers can be edited using a above screen and the user can visualize GPS tagged locations using installed mapping functions on the phone.

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Figure14a. Add an Activity to My Log Recall Workflow Screen 1
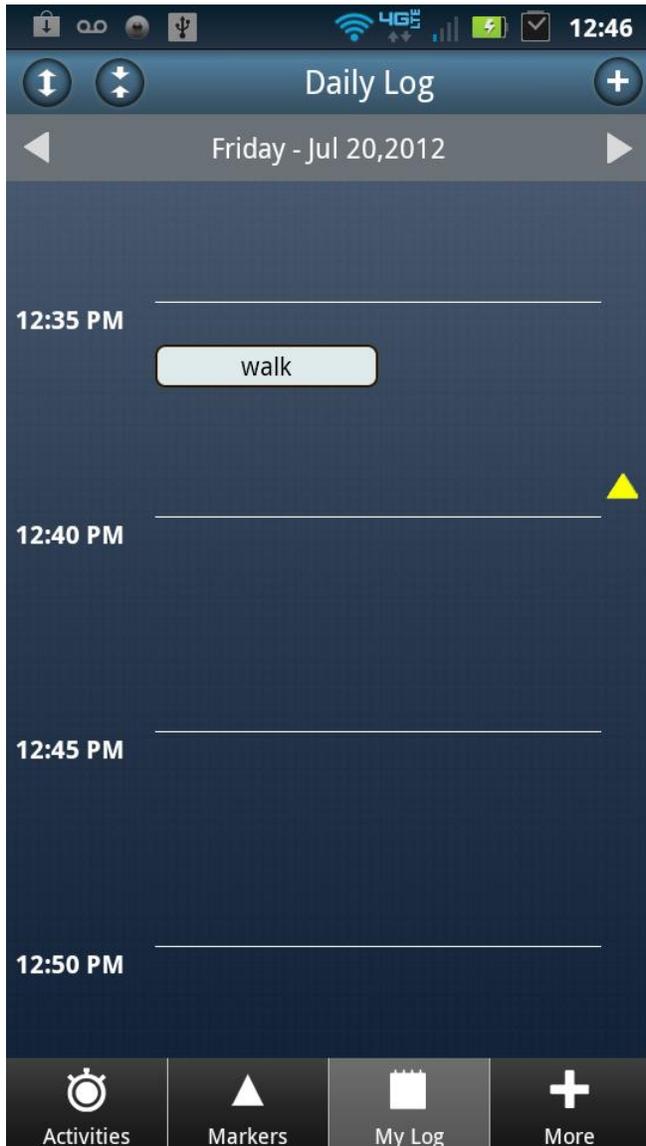
Description: To log activities using the recall function for prior activities, the user can select the correct day using the toggle arrows on the grey Date bar at the top of the screen. Then tap the + icon at the top right corner of the screen.

Figure14b. Add an Activity to My Log Recall Workflow Screen 2
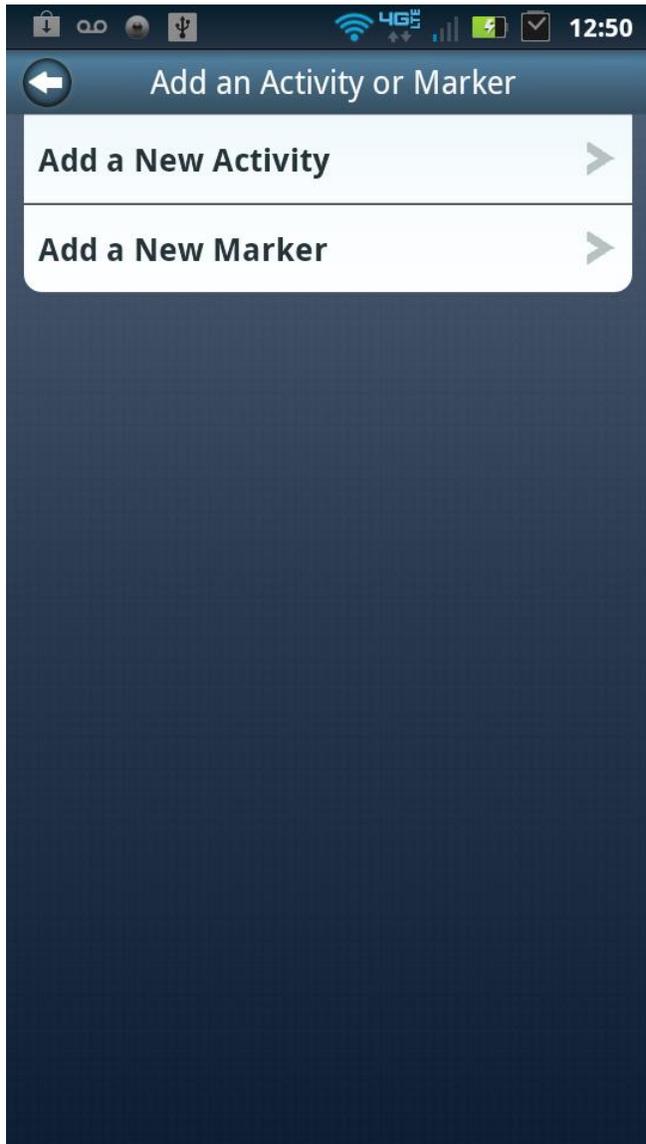
Description: Next the user taps the Add a New Activity Tab.

Figure14c. Add an Activity to My Log Recall Workflow Screen 3
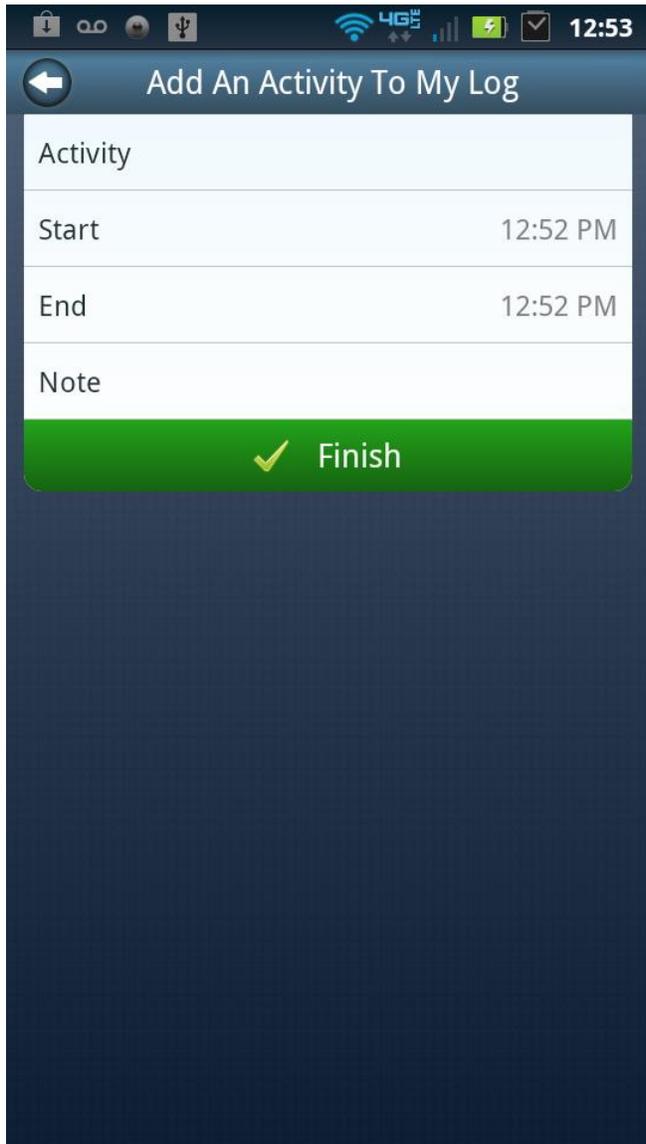

Description: Next the user taps on the Activity Tab to select an activity to add to their log.

Figure14d. Add an Activity to My Log Recall Workflow Screen 4
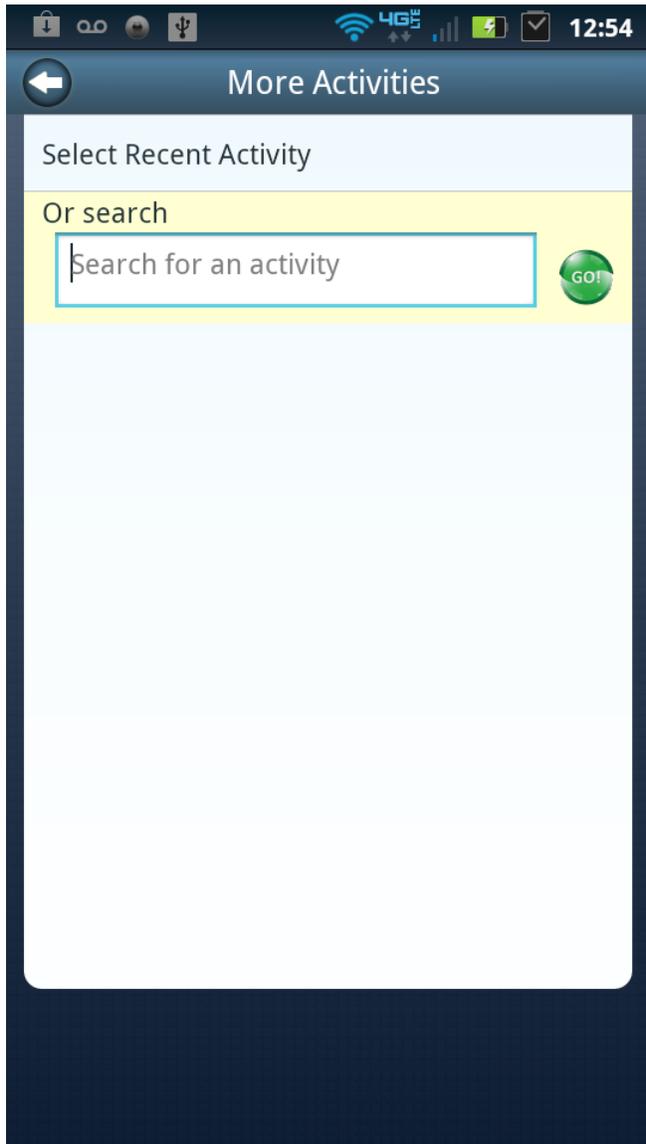

Description: The user can search for activities using text-based keywords. They can also tap on the recent activities tab to view previously reported activities.

Figure14e. Add an Activity to My Log Recall Workflow Screen 5
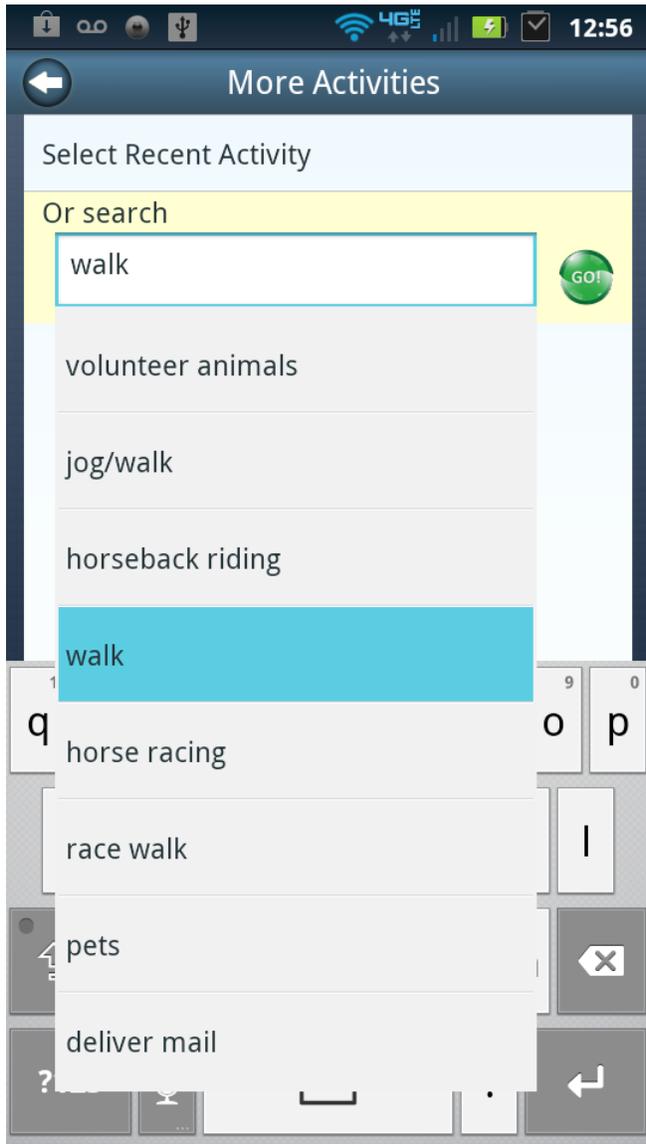
Description: The user selects an activity from activity descriptions matching the entered keyword search term and taps the green go button to continue.

Figure14f. Add an Activity to My Log Recall Workflow Screen 6
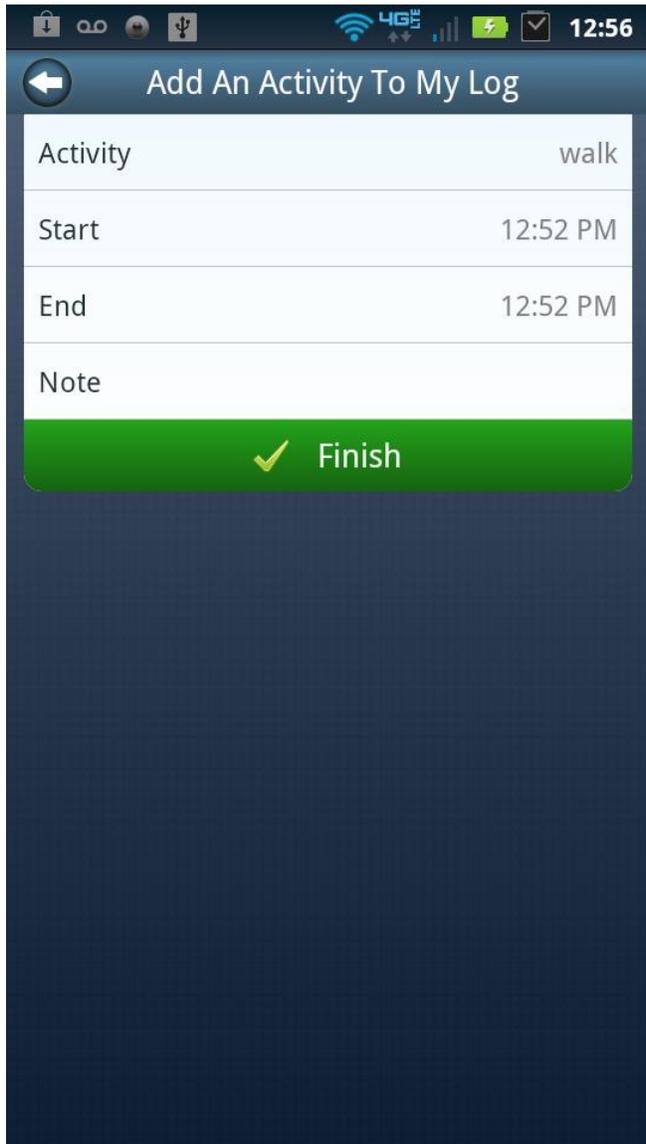
Description: The user can now modify the start and end times for the selected activity.

Figure14g. Add an Activity to My Log Recall Workflow Screen 7
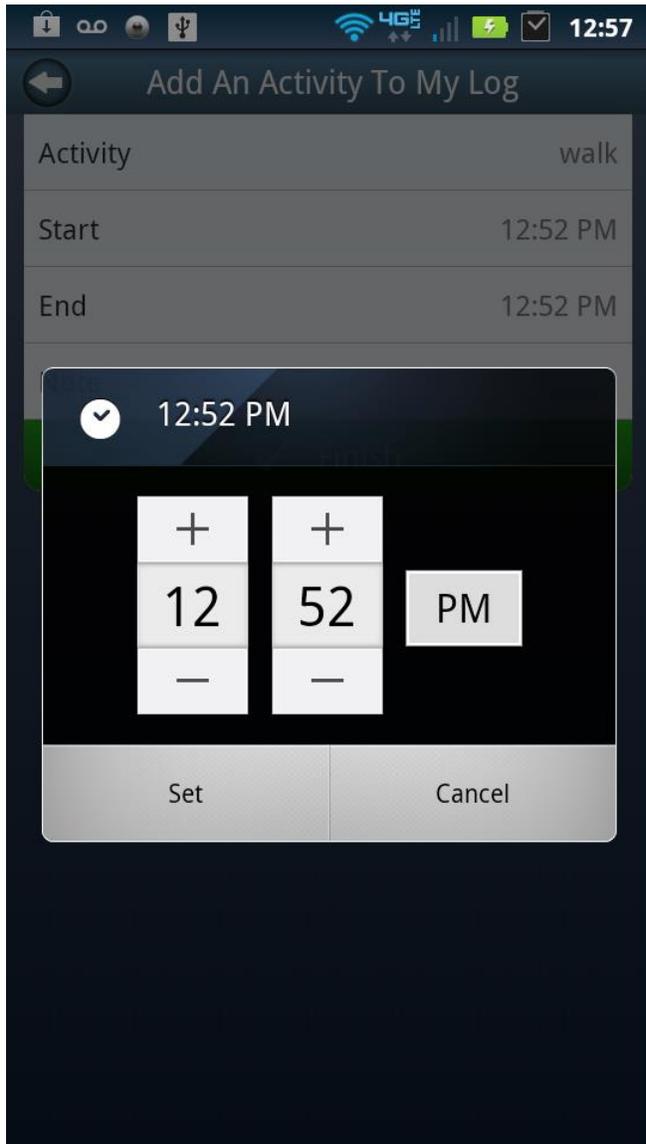
Description: Screen interface for editing activity start and end times.

Figure 14h Add an Activity to My Log Recall Workflow Screen 8
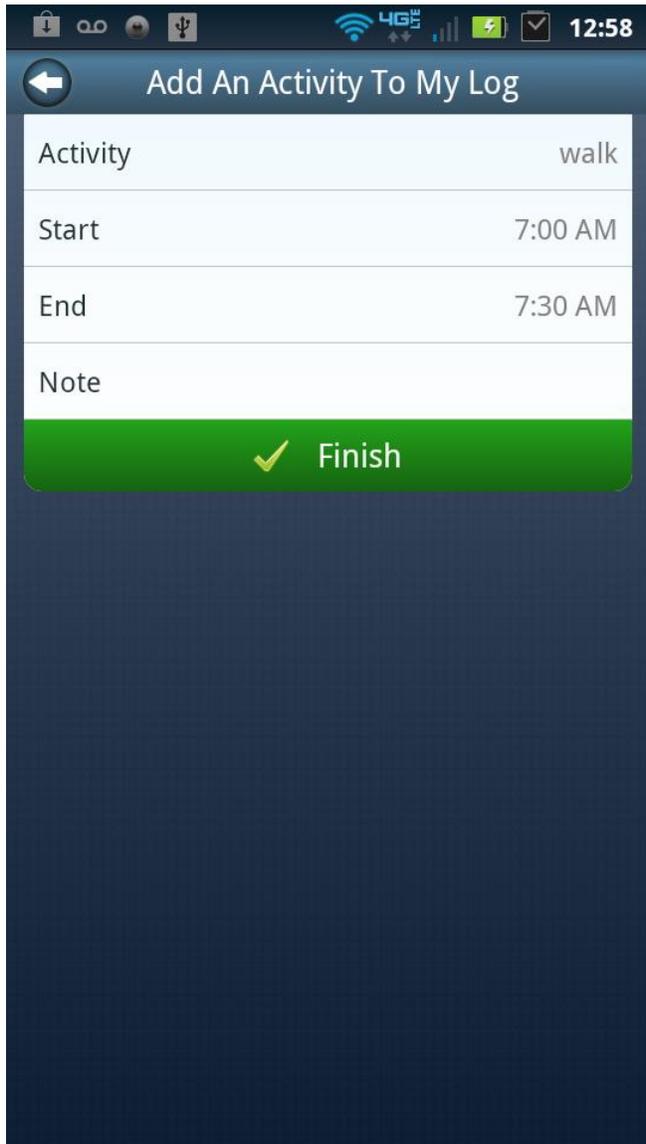
Description: Once the activity, start time, and end times are selected the user can add text-based notes if desired and complete by tapping on the Finished tab.

Figure14i. Add an Activity to My Log Recall Workflow Screen 9
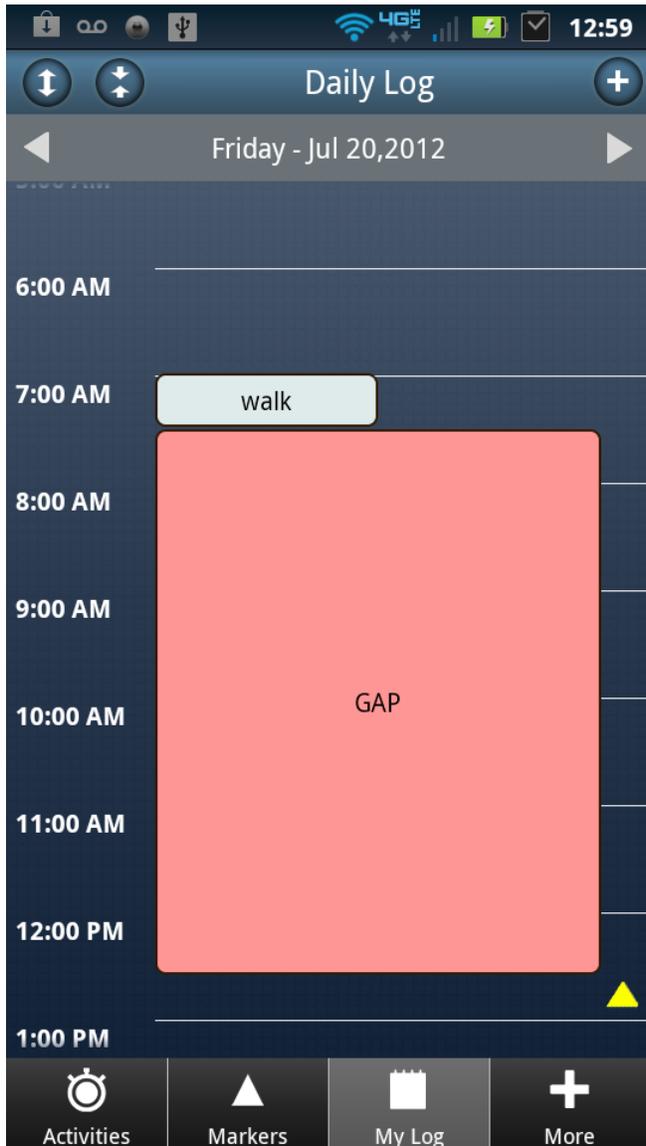
Description: The activity is written to the log for the selected time. If a gap of more than 2 minutes is present in the activities listed within the log, the application highlights the time block with a pink GAP

Figure 15a. Add an Event to My Log Recall Workflow Screen 1
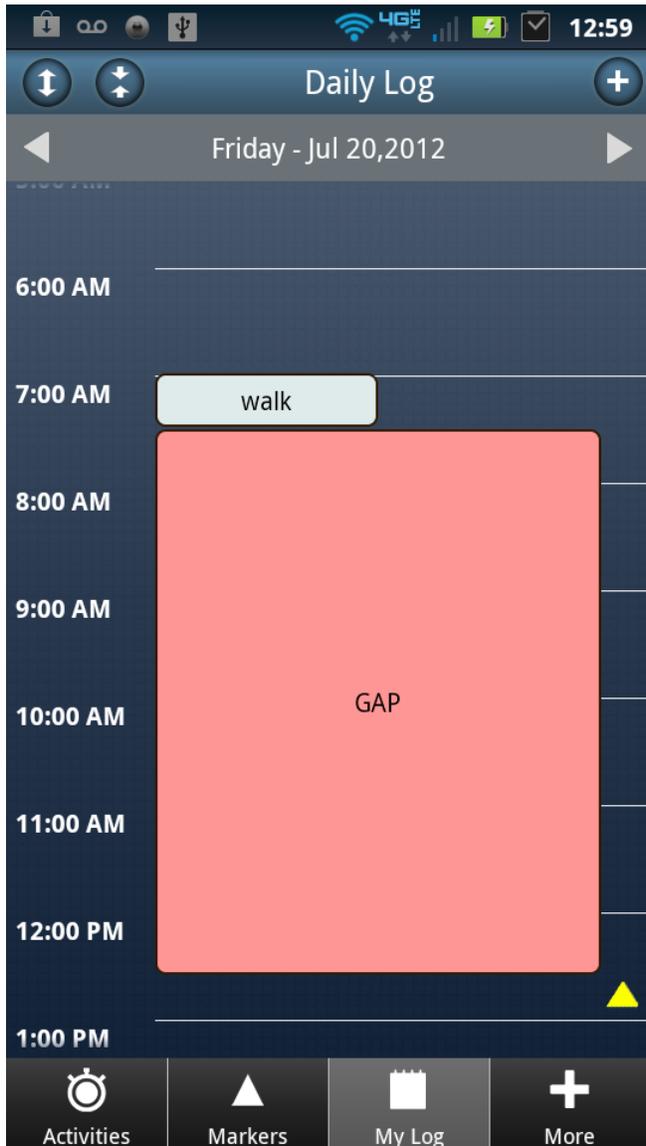
Description: To log events using the recall function for prior events, the user can select the correct day using the toggle arrows on the grey Date bar at the top of the screen. Then tap the + icon at the top right corner of the screen.

Figure 15b. Add an Event to My Log Recall Workflow Screen 2
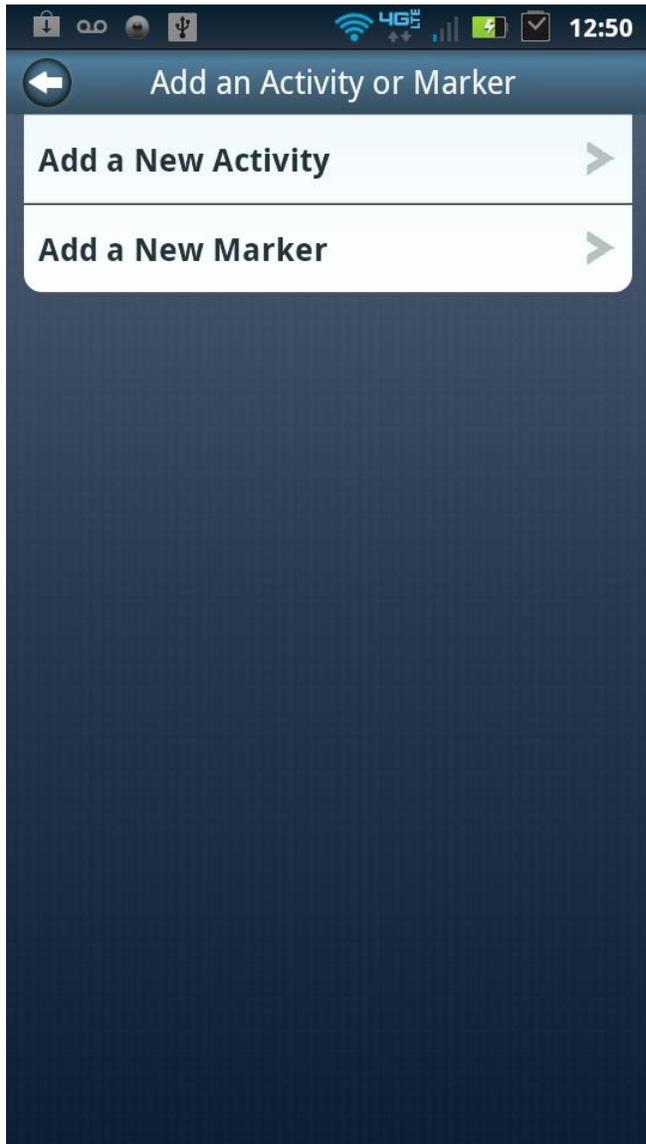
Description: The user can tap the Add a New Marker tab to add an event marker to their log.

Figure 15c. Add an Event to My Log Recall Workflow Screen 3
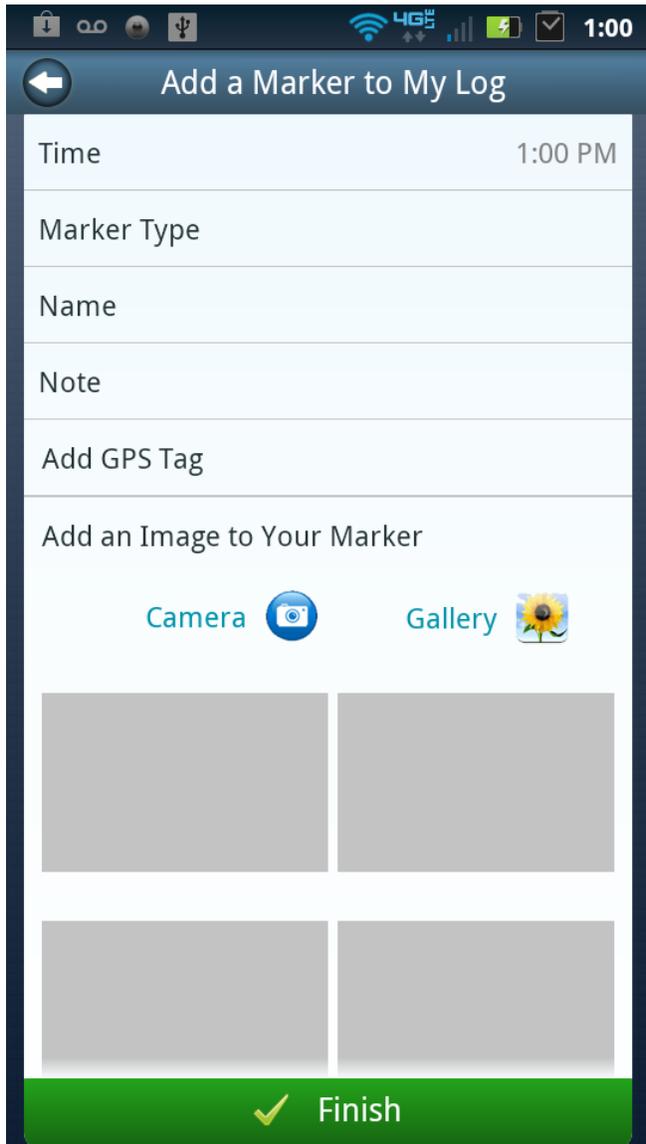
Description: The user can edit all field for the new marker including the time, type, name, text notes, and GPS and image tags. Once complete, the user taps the Finished button to save the event marker to the log.

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Figure16a. Activities Log Gap Workflow Screen 1
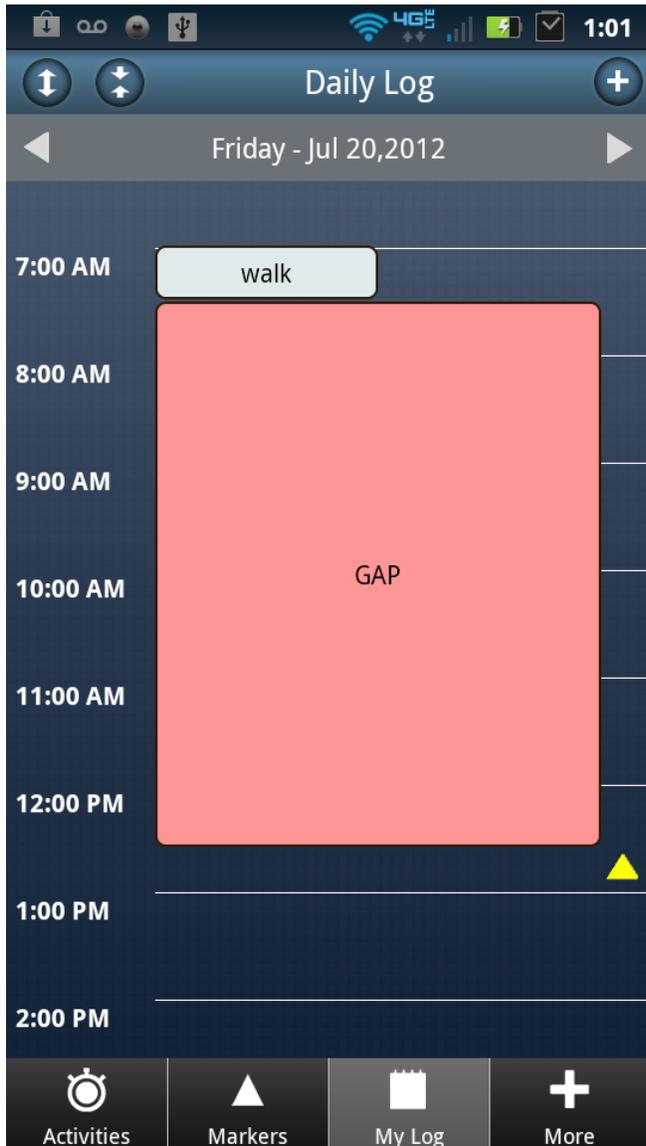
Description: If a user has a gap in time within the log, they can complete their activities log by tapping the pink time block labeled GAP.

Figure16b. Activities Log Gap Workflow Screen 2
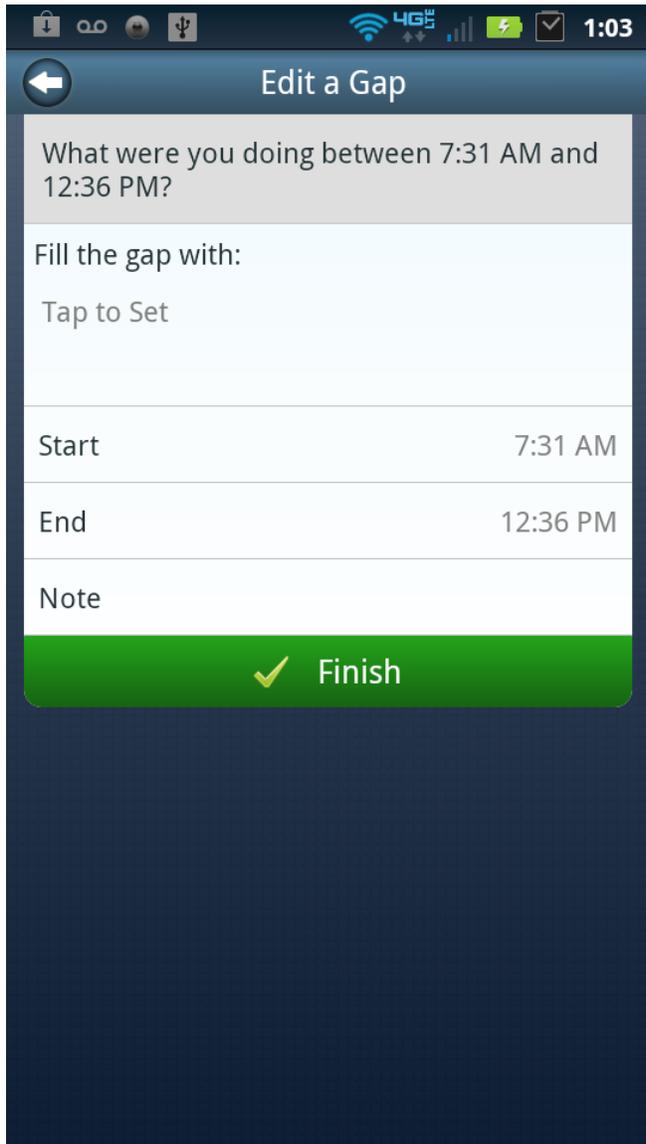
Description: The user taps the "Tap to Set" tab in order to select an activity they were doing for all or part of the time GAP.

Figure16c. Activities Log Gap Workflow Screen 3

Description: By default, the program well provide four options for activities, the previous activity in the log, the next activity in the log, an option for I don't remember, and other activities which will allow the user to search for activities. Tap the appropriate tab to select.

Figure16d. Activities Log Gap Workflow Screen 4
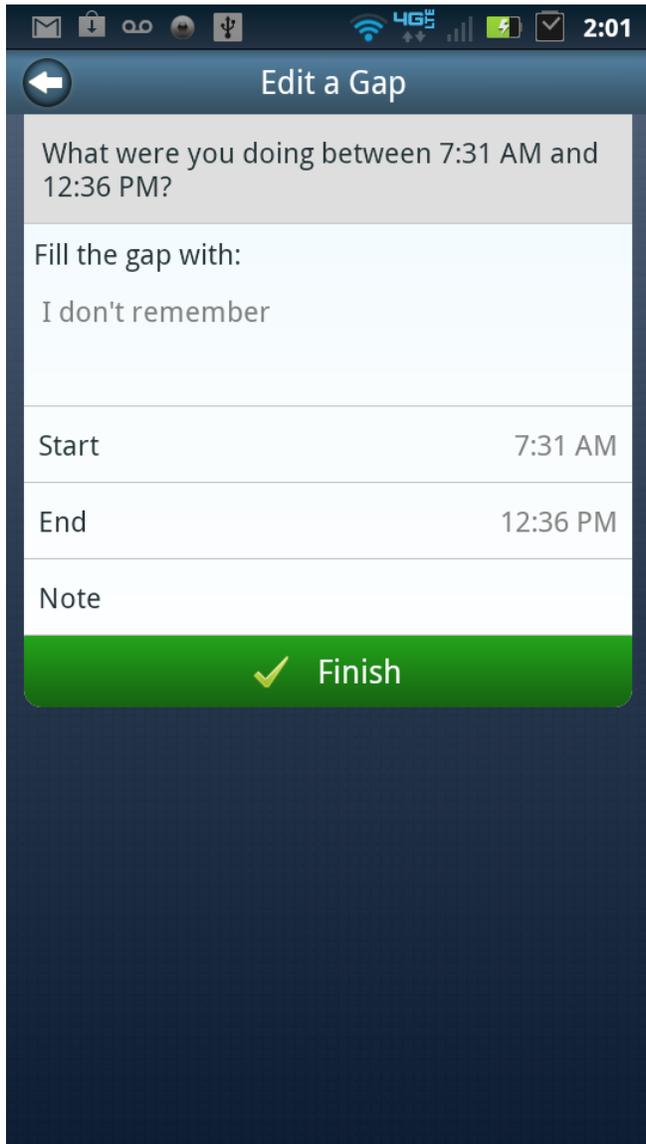
Description: Your selected activity will be displayed, next the user can edit the start and end times and add text based notes if desired.

Figure16e. Activities Log Gap Workflow Screen 5
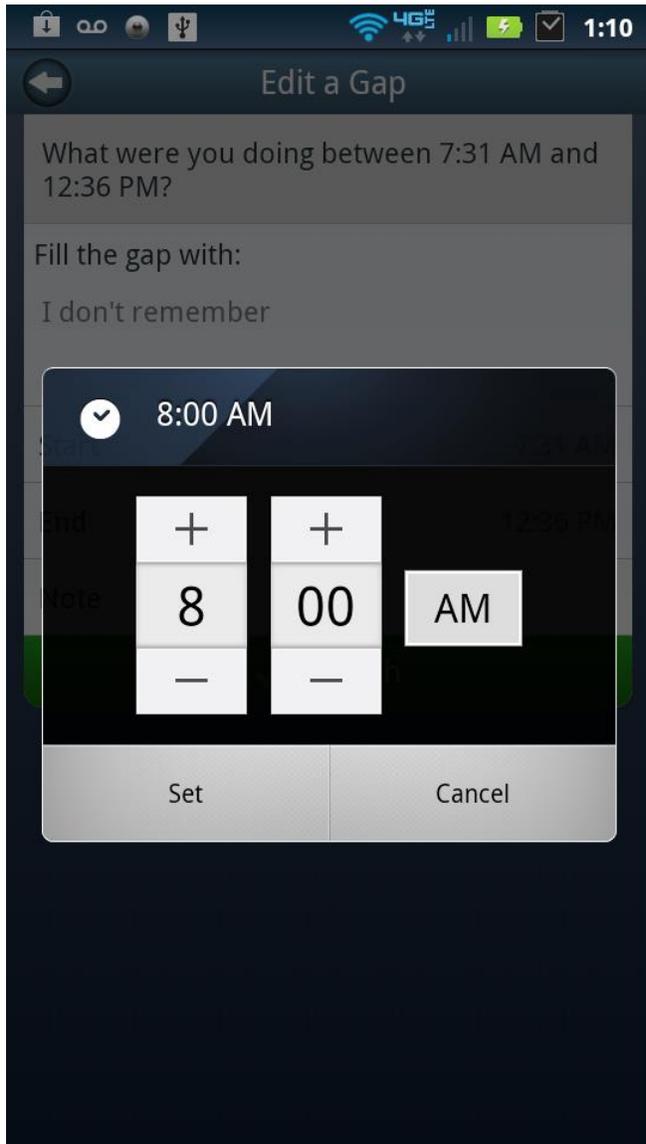
Description: Editing screen for selecting start and end times for the activity.

Figure16f. Activities Log Gap Workflow Screen 6
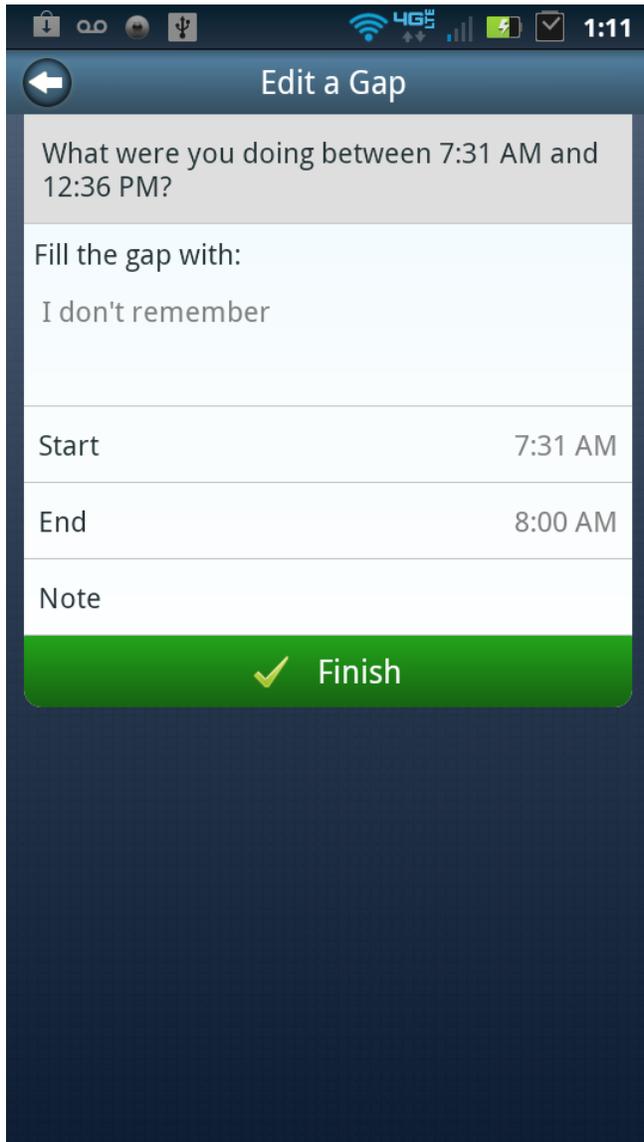
Description: Once the user selects the activity and edits or confirms the activity start and end times they can save the activity to the log by pressing Finished.

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Figure16g. Activities Log Gap Workflow Screen 7
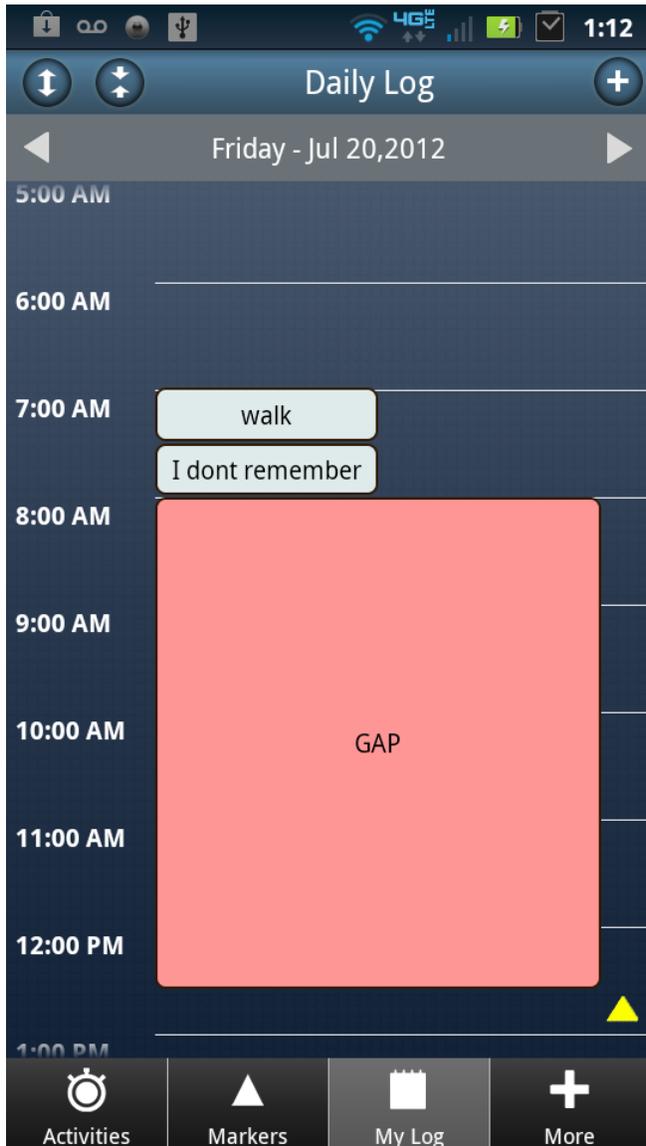
Description: The new activity is now displayed in the Daily Log. If more than two minutes gap remains for reported activities the pink GAP time block well still be displayed. To fill in additional activities simple tap the GAP time block and repeat the process.
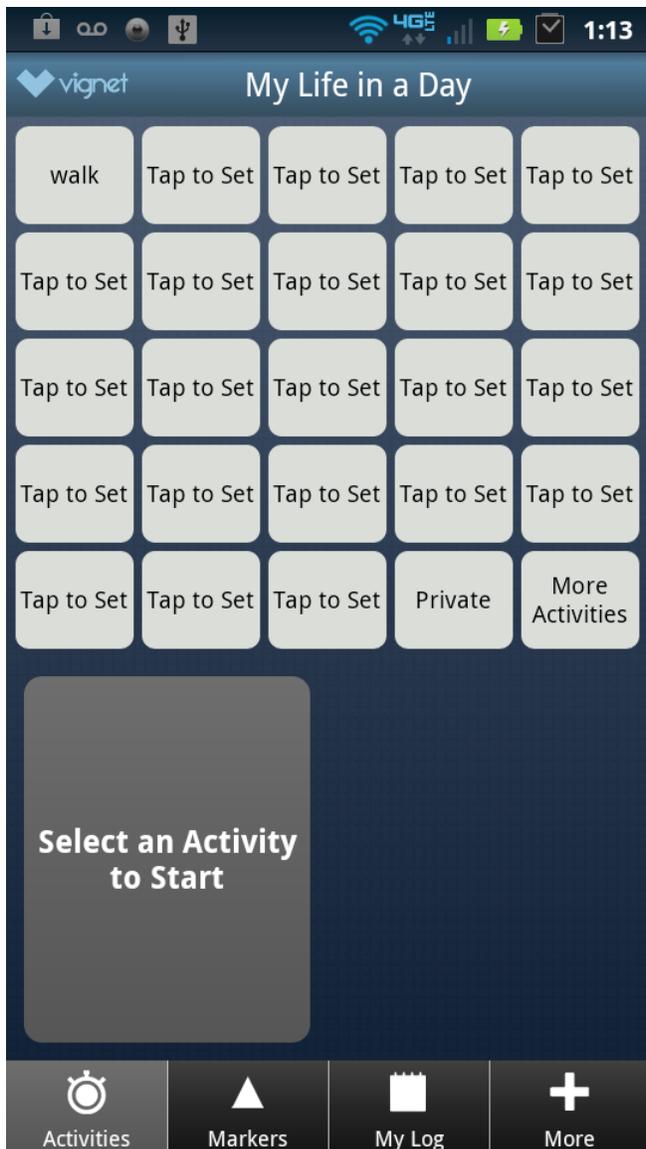
Description: The more activities button allows the user to log real-time activities using the stopwatch function by selecting activities other than the 23 customizable buttons. Tap the More Activities button to begin.
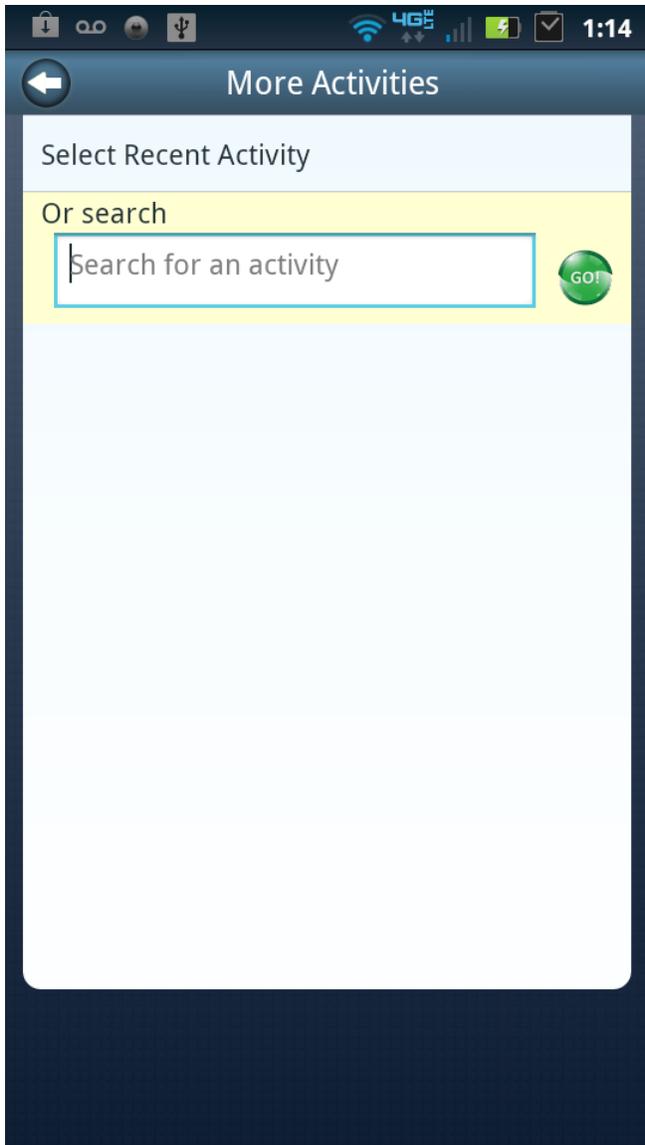
Description: The user can search for activities using text-based keywords, or tap the grey select recent activities tab to select from a list of previously logged activities.

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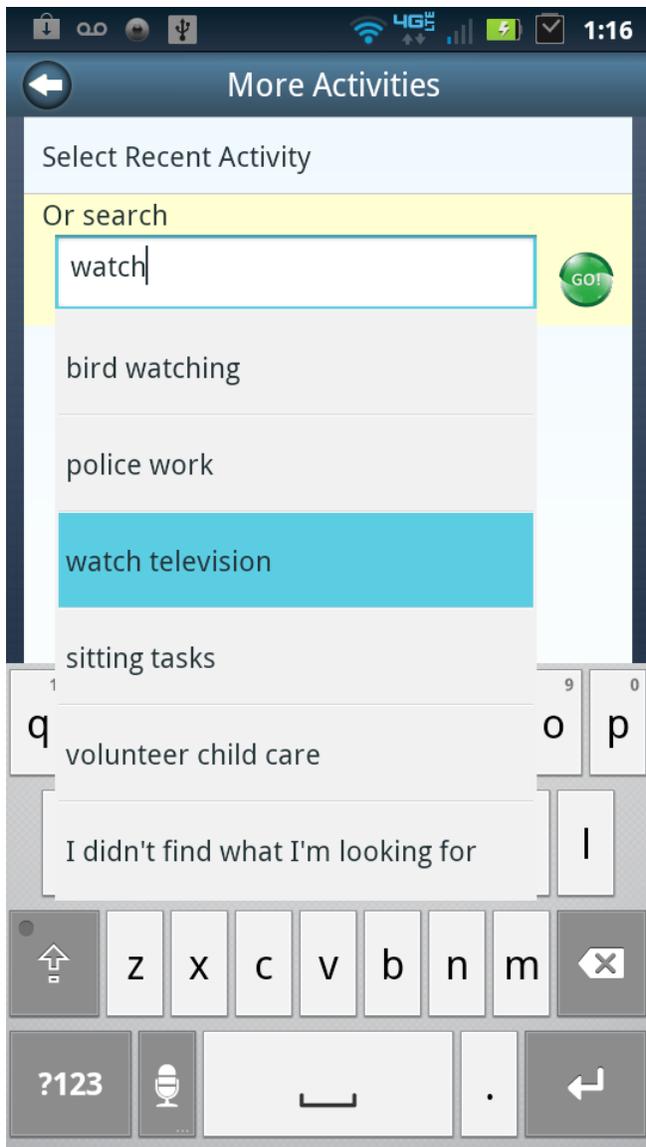
Description: Search for activities using text-based search terms and select the appropriate activity description, or select I didn't find what I'm looking for to create a new activity in the users database.
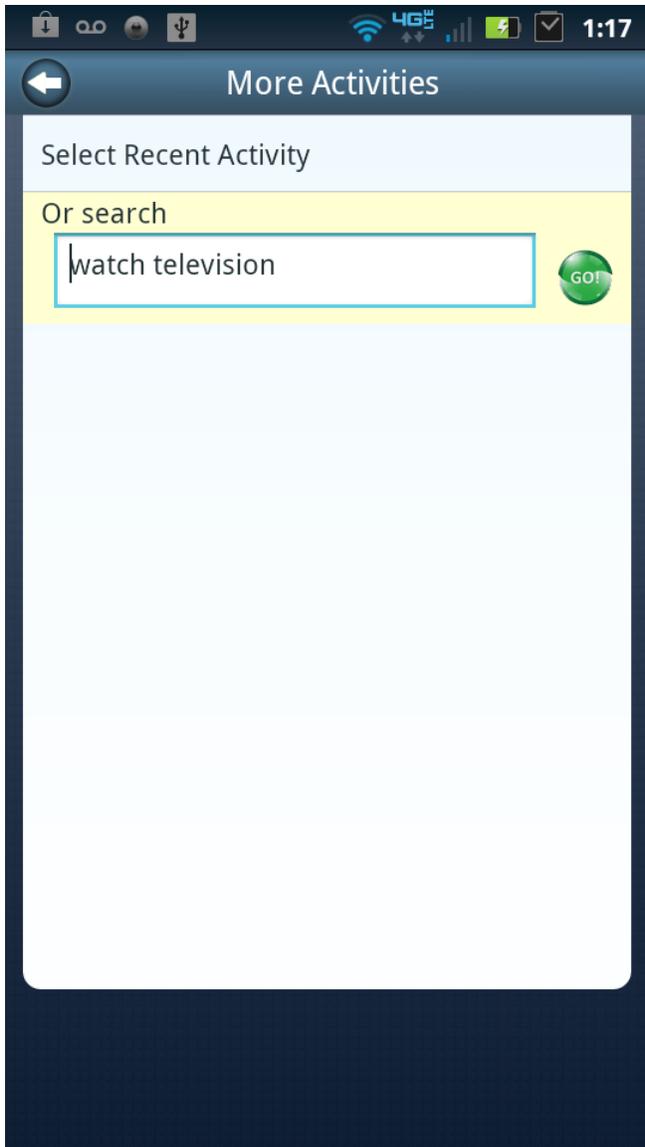
Description: Once you select an activity press the green GO circle to start logging the new activity using the stopwatch feature.
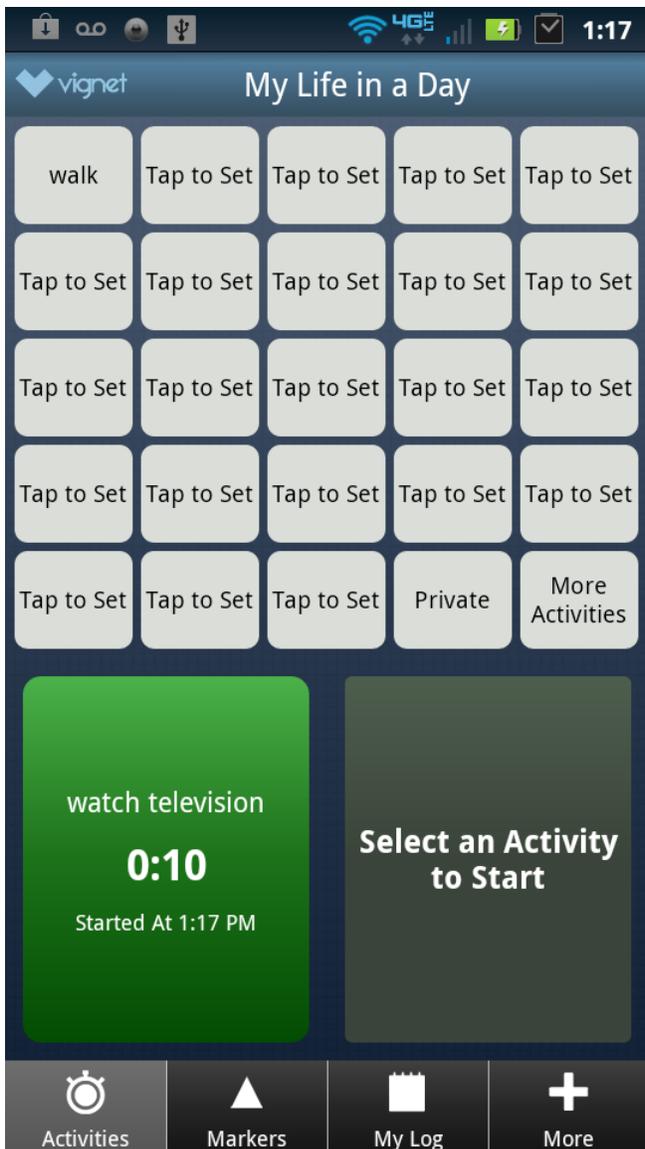
Description: To stop recording an activity selected from the more activities button, tap the appropriate green stopwatch timer button.
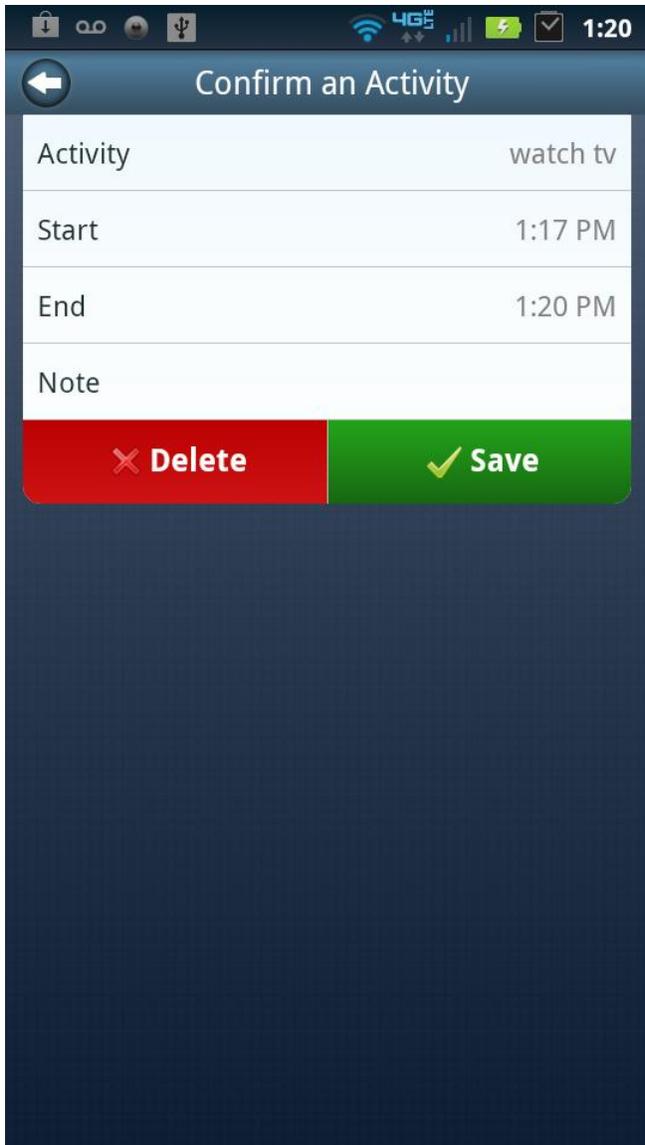
Description: The user can confirm or edit the start and end times for the activity, add text-based notes, delete the activity or save it to the log.
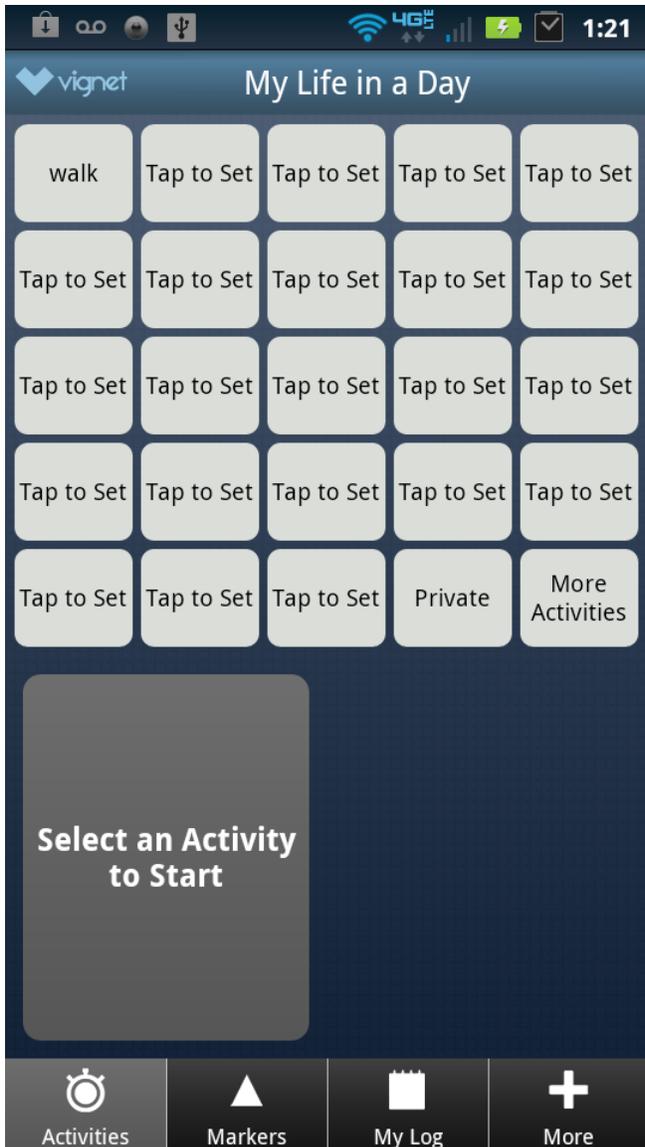
Description: After you save the activity the stopwatch will be available to log another activity and you can review your logged activities by tapping the My Log button at the bottom of the screen.
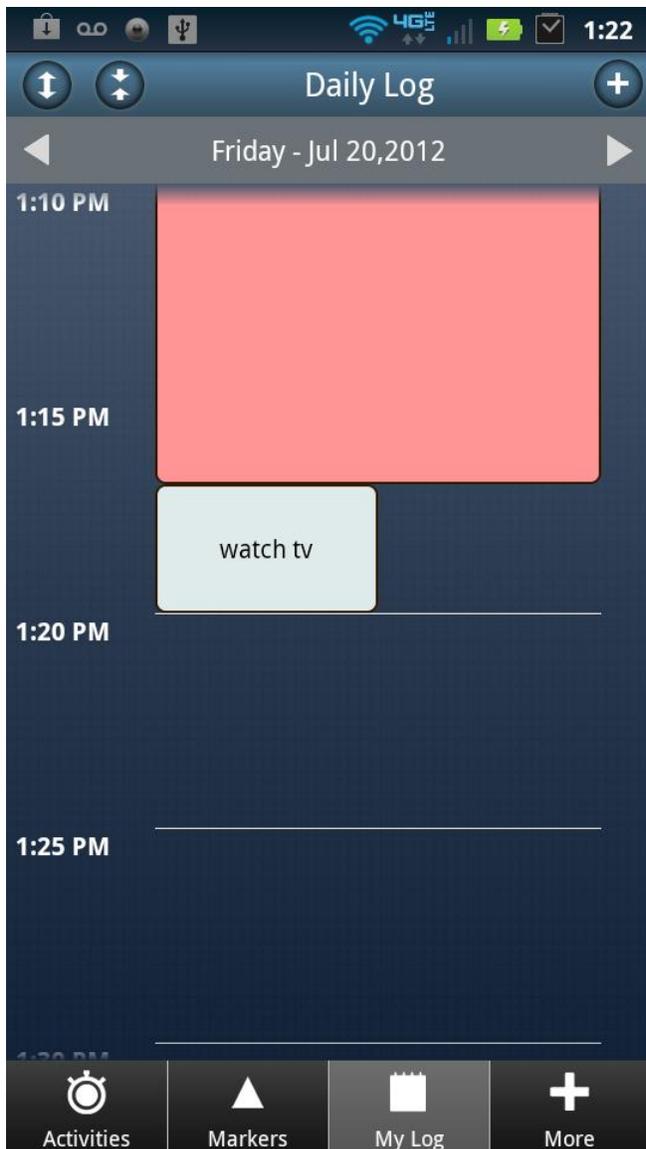
Description: Newly logged activities are displayed in the log view for review or editing.

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Appendix D
Most Prevalent ATUS Activity Codes
Using the Second Level of ATUS Activity Codes

Tier2 code	Description	Precodes	Percent	Cummul.per.
1203	Socializing relaxing and leisure: Relaxing and leisure	Watching TV	12.9	12.9
101	Personal care: Sleeping	Sleeping	11.41	24.31
1101	Eating and drinking: Eating and drinking	Eating and drinking	10.37	34.68
102	Personal care: Grooming	Grooming	7.02	41.7
202	Household activities: Food and drink prep.	Preparing meals or snacks	6.26	47.96
1807	Travel: Travel related to consumer purchases		4.98	52.94
301	Care for HH members: Care for HH children		4.52	57.46
501	Work: Working	Working at main job, Working at other job	4.26	61.72
201	Household activities: Housework	Cleaning kitchen, laundry	3.39	65.11
701	Consumer purchases: Shopping	Grocery shopping	3.39	68.5
1201	Socializing relaxing and leisure: Socializing and communicating		2.93	71.43
1805	Travel: Travel related to work		2.91	74.34
1812	Travel: Travel related to socializing, relaxing, and leisure		2.8	77.14
209	Household activities: Household management	Paying household bills	1.98	79.12
1811	Travel: Travel related to eating and drinking		1.92	81.04
1803	Travel: Travel related to care for HH members		1.89	82.93
206	Household activities: Animals and pets		1.47	84.4
5001	Data codes: unable to code		1.28	85.68
1301	Sports, exercise, and recreation: participating in sports		1.19	86.87
1804	Travel: Travel related to care for nonHH members		1.06	87.93
1601	Telephone calls: Telephone calls		0.99	88.92
1401	Religious and spiritual activities: Religious/spiritual practices	Attending religious service	0.91	89.83
1802	Travel: Travel related to household activities		0.76	90.59

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Most Prevalent ATUS Activity Codes
Using the Third Level of ATUS Activity Codes

Tier3 code	Description	Precode	Percent	Cummul.per.
10101	Personal care: Sleeping: Sleeping	Sleeping	11.16	11.16
110101	Eating and drinking: Eating and drinking: Eating and drinking	Eating and Drinking	10.37	21.53
120303	Socializing, relaxing, and leisure: Relaxing and leisure: Television and movies (not religious)	Watching TV	7.98	29.51
10201	Personal care: Grooming: Washing, dressing, and grooming oneself	Grooming	7.02	36.53
20201	Household activities: Food and drink prep.: Food and drink prep.	Preparing meals or snacks	4.66	41.19
50101	Work: Work: Work, main job	Working at main job	4.08	45.27
120101	Socializing, relaxing, and leisure: Socializing and communicating: Socializing and communicating with others		2.93	48.2
180501	Travel: Travel related to work: Travel related to work		2.84	51.04
180704	Travel: Travel related to consumer purchases: Travel related to shopping		2.29	53.33
30101	Care for HH members: Care for children: Physical care for HH children		2.27	55.6
181101	Traveling: Travel related to eating and drinking: Travel related to eating and drinking		1.92	57.52
20101	Household activities: Housework: Interior cleaning		1.69	59.21
181201	Travel: Travel related to socializing, relaxing, and leisure: Travel related to socializing and communicating		1.69	60.9
120312	Socializing, relaxing, and leisure: Relaxing and leisure: Reading for personal interest		1.67	62.57
70104	Consumer purchases: Shopping: Shopping, except groceries food and gas		1.61	64.18
180301	Traveling: Travel related to care for HH members: Travel related to caring for HH children		1.6	65.78
20203	Household activities: Food and drink prep.: Kitchen and food clean-up	Cleaning kitchen	1.49	67.27
180701	Traveling: Travel related to consumer purchases: Travel related to grocery shopping		1.49	68.76
120301	Socializing, relaxing, and leisure: Relaxing and leisure: Relaxing, thinking		1.3	70.06
20102	Household activities: Housework: Laundry	Laundry	1.25	71.31

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Tier3 code	Description	Precode	Percent	Cummul.per.
20902	Household activities: Household management: Household & personal organization and planning		1.04	72.35
20601	Household activities: Animals and pets: Care for animals and pets		0.96	73.31
70101	Consumer purchases: Shopping: Grocery shopping	Grocery shopping	0.89	74.2
180703	Traveling: Travel related to consumer purchases: Travel related to purchasing food		0.88	75.08
120308	Socializing, relaxing, and leisure: Relaxing and leisure: Computer use for leisure		0.84	75.92
30112	Care for HH members: Care for children: Picking up/dropping off children		0.8	76.72
500101	Data codes: Unable to code: Insufficient detail in verbatim		0.73	77.45
180405	Traveling: Travel related to care for non HH members: Travel related to helping non HH adults		0.7	78.15
181301	Traveling: Travel related to sports, exercise, and recreation: Travel related to participating in sports/exercise/rec.		0.66	78.81
70103	Consumer purchases: Shopping: Purchasing food (not groceries)		0.65	79.46
120307	Socializing, relaxing, and leisure: Relaxing and leisure: Playing games		0.64	80.1
181401	Traveling: Travel Related to Religious/Spiritual Activities: Travel related to religious/spiritual practices		0.63	80.73
20501	Household Activities: Lawn, Garden, and Houseplants: Lawn, garden, and houseplant care		0.62	81.35
10301	Personal Care: Health-related Self Care: Health-related self care		0.6	81.95
181203	Traveling: Travel Related to Socializing, Relaxing, and Leisure: Travel related to relaxing and leisure		0.55	82.5
30103	Caring For & Helping Household (HH) Members: Caring For & Helping HH Children: Playing with HH children, not sports		0.53	83.03
20602	Household Activities: Animals and Pets: Walking / exercising / playing with animals		0.51	83.54
140101	Religious and Spiritual Activities: Religious/Spiritual Practices: Attending religious services		0.46	84
160101	Telephone Calls: Telephone Calls (to or from):Telephone calls to/from family members		0.46	84.46

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Tier3 code	Description	Precode	Percent	Cummul.per.
180209	Traveling: Travel Related to Household Activities: Travel related to household management		0.43	84.89
20104	Household Activities: Housework: Storing interior HH items, Inc. food		0.37	85.26
20904	Household Activities: Household Management: HH & personal e-mail and messages		0.37	85.63
189999	Traveling: Traveling, n.e.c.:Traveling, n.e.c.		0.36	85.99
500106	Data Codes: Unable to Code: Gap/can't remember		0.36	86.35
140102	Religious and Spiritual Activities: Religious/Spiritual Practices: Participation in religious practices		0.35	86.7
181501	Traveling: Travel Related to Volunteer Activities: Travel related to volunteering		0.35	87.05
40507	Caring For & Helping Nonhousehold (NonHH) Members: Helping Nonhousehold Adults: Picking up/dropping off nonhh adult		0.34	87.39
60301	Education: Research/Homework: Research/homework for class for degree, certification, or licensure		0.32	87.71
130131	Sports, Exercise, and Recreation: Participating in Sports, Exercise, or Recreation: Walking		0.32	88.03
180401	Traveling: Travel Related to Caring For & Helping Nonhh Members: Travel related to caring for and helping nonhh children		0.32	88.35
180702	Traveling: Travel Related to Consumer Purchases: Travel related to purchasing gas		0.32	88.67
20903	Household Activities: Household Management: HH & personal mail & messages (except e-mail)		0.31	88.98
160102	Telephone Calls: Telephone Calls (to or from):Telephone calls to/from friends, neighbors, or acquaintances		0.27	89.25
181204	Traveling: Travel Related to Socializing, Relaxing, and Leisure: Travel related to arts and entertainment		0.26	89.51
10102	Personal Care:Sleeping:Sleeplessness		0.25	89.76
30201	Caring For & Helping Household (HH) Members: Activities Related to HH Children's Education: Homework (hh children)		0.24	90

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- Sleeping

- Washing, dressing, and grooming oneself

- Watching TV

- Eating and Drinking

  – Eating or Drinking – meals, snacks, drinks

  – Food and drink preparation

  – Kitchen and food clean-up

- Socializing, Relaxing, and Leisure

  – Socializing and communicating with others

  – Reading for personal interest

  – Relaxing/thinking

  – Computer use for leisure

  – Playing games

  – Arts and entertainment

- Personal Care

  – Grooming

  – Health-related self-care

  – Personal, private activities

  – Personal care emergencies

- Work

  - Working at main job

  - Working at other jobs

  - Other income generating activity

  - Job search and interviewing

- Household Activities

  - Interior cleaning

  - Laundry

  - Sewing

  - Indoor or outdoor maintenance, repair, and decoration

  - Lawn, garden, and houseplants

  - Animals and pets

  - Vehicles

  - Appliances, tools, and toys

  - Household management

- Shopping

  - Grocery shopping

  - Purchasing gas

  - Purchasing food (not groceries)

  - Other shopping

- Travel

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- Care for Household Members

  – Use existing ATUS tier 2 codes

    o Use existing ATUS tier 3 codes

- Care for non-Household Members

  – Use existing ATUS tier 2 codes

    o Use existing ATUS tier 3 codes

- Education

  – Use existing ATUS tier 2 codes

    o Use existing ATUS tier 3 codes

- Professional and Personal Care Services

  – Use existing ATUS tier 2 codes

    o Use existing ATUS tier 3 codes

- Household Services

  – Use existing ATUS tier 2 codes

    o Use existing ATUS tier 3 codes

- Government and Civic Obligations

  – Use existing ATUS tier 2 codes

    o Use existing ATUS tier 3 codes

- Sports, Exercise, and Recreation

  – Participating in sports, exercise, or recreation

  – Attending sporting or recreational events

- Religious and Spiritual Activities

  – Use existing ATUS tier 2 codes

    o Use existing ATUS tier 3 codes

■ Volunteer Activities

— Use existing ATUS tier 2 codes

o Use existing ATUS tier 3 codes

■ Telephone Calls

■ Other

■ Don't know/ Can't Remember

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