

PARTICIPATING IN A DAILY DIARY STUDY OF STRESS AND COPING:

AN EXPLORATION OF REACTIVITY

by

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## Abstract

Daily process methods are becoming increasingly common in both health and social science research. However, the issue of how these intensive self-monitoring procedures affect participants and the information provided has not been systematically studied. In the present study, I explored the issue of reactivity in a daily diary study of workplace stress and coping among female clerical workers ( $n = 74$ ), and compared them to clerical workers who did not self-monitor ( $n = 101$ ). Daily diary participants provided information on stressors, coping, and mood twice a day for 15 consecutive workdays (30 occasions). At the end of the recording period participants reported on the overall experience of daily self-monitoring as well as on whether daily self-monitoring affected their behavior and mood. Participants also completed measures of distress (anxiety and depression) and satisfaction (job and life) both before and after completing the daily diaries. Finally, the role of individual differences [negative affect (NA) and depressive symptomatology] in reactivity was also examined. Results of repeated measures MANOVAs suggested that twice daily self-monitoring of stress and coping does not have a significant impact on daily mood during recording. Nor was there evidence of short-term effects of daily self-monitoring on participants' satisfaction and distress. However, content analysis revealed that participants' perceived daily self-monitoring to have had an impact. Though there was no evidence that this perceived impact was related to NA or depressive symptomatology, trend analysis showed that level of NA was associated with differential trends in daily anxious and depressed mood. Possible explanations for findings are discussed.

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## INTRODUCTION

Numerous researchers, particularly in the area of stress and coping, have lauded the merits of daily process designs, which focus on the course of change *within* individuals as well as differences *across* individuals (e.g., DeLongis, Hemphill, & Lehman, 1992; Eckenrode & Bolger, 1995; Tennen, Affleck, Armeli, & Carney, 2000). Advances in technology (e.g., palmtop computers and statistical software) and analytical strategies for analyzing within individual changes (e.g., Hierarchical Linear Modeling; Bryk & Raudenbush, 1992), coupled with a theoretical rationale for their use (e.g., Tennen et al., 2000), have led to daily process methods becoming increasingly prevalent in the social sciences. Daily process procedures require participants to record over a specified period of time (e.g., self-monitor), which may range from multiple times per day to once a day for 112 days. Thus, expectations of participants are greater than in traditional research. Yet the extent to which, and whether, more intensive recording affects participants and consequently the data collected is unknown and is the focus of the present study. Given the increasing use of daily process methods to study not only the stress and coping process, but also a number of other phenomena (e.g., health behaviors, pain), the concern that such intensive research procedures could affect the very processes under investigation is far from trivial (Tennen et al., 2000).

The daily diary method is one of several types of data collection means used in daily process designs. In daily diary studies participants usually record at set intervals (i.e., once or twice a day) in a booklet. This booklet contains a number of measures and may have a combination of open-ended questions and structured scales. There are a number of reasons this method is often used to study the process of stress and coping. First, acquiring daily measurements allows researchers to track variables over time and is consistent with current conceptualizations of stress and coping that highlight the temporally unfolding nature of

adaptational processes (e.g., Lazarus & Folkman, 1984). Second, stress and coping researchers argue that daily process methods increase the reliability and validity of self-report measures (DeLongis et al., 1992). Finally, daily diary methods are considered less costly and less invasive than other daily process methods [e.g., Ecological Momentary Assessment (EMA)].

In order to determine the characteristics of typical daily diary studies, I reviewed 36 daily diary studies that focused on stress and coping processes in healthy, adult samples. This overview revealed the breadth of research questions that can be addressed using a daily diary method. Moreover, there are a number of general characteristics evident in daily diary research on stress and coping. First, most study samples were limited to Caucasian, mixed male and female samples. Second, most studies had participants record on a daily basis, once a day. Finally, participants in daily diary studies provided information using pencil and paper measures. The present study is representative of “typical” daily diary studies of stress and coping in terms of duration of recording, measures used, and ethnicity.

Although there has been no systematic research on the effects of daily process methods on participants and hence the data collected, there is a considerable body of literature on reactivity to self-monitoring procedures in the field of behavioral assessment. Research in this area has focused on identifying variables that influence reactivity (e.g., type of behavior recorded, number of behaviors self-monitored). Because daily process research usually asks participants to report on a number of different variables (e.g., mood, behaviors), proponents of daily process designs (e.g., Tennen et al., 2000) support this method by citing findings from behavioral assessment research, which suggests that self-monitoring more than one behavior reduces reactive effects (Hayes & Cavior, 1977, 1980). However, there are a number of reasons that make applying the findings on reactivity from behavioral assessment research to daily process designs problematic.

Research on the effects of daily measurement of health behaviors (e.g., health diaries) and

pain, similar to research on behavioral assessment and reactivity, suggests that reactivity is a potential concern when participants are asked to self-monitor. However, it is difficult to draw conclusions about reactive effects of daily diary methods based on existing research because the contexts and/or number and types of variables monitored among disciplines are substantially different.

Unlike the literature on reactivity that focuses on identifying variables that influence reactivity, the research on the effects of research participation (e.g., Brannen, 1993) identifies the issue of individuals' responses to research and suggests that participation has both positive and negative effects (e.g., Daugherty & Lawrence, 1996). This research implies that further consideration needs to be given to the possibility that participating in research may affect participants, echoing concerns raised by researchers about reactivity to daily process methods (e.g., Tennen et al., 2000). As well, soliciting participants' perceptions of the impact of participation is important and may help researchers better understand reactivity (e.g., Affleck, Tennen, Zautra, & Armeli, 1999; Verbrugge, 1989).

Research findings on responses to research participation suggest that personality dimensions (e.g., neuroticism) may play a role in differential responding to self-report questionnaires (Daugherty & Lawrence, 1996). As well, daily process researchers have found some evidence of differential response patterns among participants (Affleck, Tennen, Urrows, & Higgins, 1994). Thus, individual differences in response to self-monitoring are important in considering reactivity to daily process methods. The negative emotional reactivity that characterizes individuals high in neuroticism, also referred to as trait Negative Affect (NA; Watson & Clark, 1984) suggests that this broad personality dimension may distinguish among different responses to daily self-monitoring. In addition to exploring NA, the role of depressive symptoms in influencing reactivity was examined. Depression is associated with a propensity to

self-focus (e.g., Ingram, Lumry, Cruet, & Sieber, 1987) and both depression and self-focus have been associated with rumination (e.g., Nolen-Hoeksema, Morrow, & Fredrickson, 1993; Wood et al., 1990). In turn, rumination may exacerbate depression (Nolen-Hoeksema et al., 1993).

The present study made use of data collected as part of a larger study on stress and coping in female clerical workers ( $N = 175$ ). Of this larger sample, 74 women took part in a daily diary study of work stress. Participants in the diary study recorded twice a day for 15 consecutive workdays (30 occasions). In the present study, I sought evidence of reactivity through an examination of daily changes in mood and a comparison of diary and non-diary participants on measures of anxiety, depressive symptomatology, and job and life satisfaction. As well, participants' perceptions of how daily self-monitoring affected them were examined. Finally, individual differences in NA and depressive symptomatology were explored in relation to systematic changes in daily mood and participant perceptions regarding the impact of daily self-monitoring. Because there was little information on which to base specific hypotheses about the reactivity of daily diary methods I posed exploratory research questions.

## LITERATURE REVIEW

The purpose of the present study was to explore the possible reactive effects of using daily diaries to study stress and coping in adults. Data were from a larger study on work stress among female clerical workers (Long, unpublished data). In this chapter, I briefly describe daily diary designs and their use in stress and coping research. Following a general overview of daily diary studies focused on stress and coping processes, I then provide a critique of the literature on the reactivity of self-monitoring procedures and review explanations for reactivity. As well, the small body of research on the effects of participating in research is discussed in light of the issue of reactivity. Because daily diary research requires participants to focus on particular aspects of their experience, research on self-focused attention is discussed. Finally, individual differences that may affect participants' reactivity to daily self-monitoring are identified.

### Daily Process Methods

Daily process methods are well suited for researchers interested in exploring naturally occurring change. If the phenomena of interest are thought to be dynamic, rather than static (i.e., unfolding over time vs. remaining constant), measuring variables on a daily (or within-day) basis allows researchers to explore the temporally evolving nature of the phenomenon or experience. In describing what constitutes a daily process design, Affleck et al. (1999) explained that in such studies the "repeatedly measured dependent variables are thought to change in *meaningful* [original italics] ways from day to day (or within a day) and are measured *prospectively* [original italics] at daily (or within-day) intervals" (p. 747).

Daily process designs differ in three main ways. First, daily process methods differ in how participant responding is scheduled. Participants may be required to respond at a fixed time each day (or within a day), on an *interval-contingent* schedule, or randomly in response to a signal, on a *signal-contingent* schedule. As well, participants may respond after a particular event or

situation has occurred on an *event-contingent* schedule. Daily process methods also differ in how participants record their responses (e.g., paper-and-pencil measures or some type of automated machine like a palmtop computer). Finally, daily process designs differ in terms of frequency and duration of self-monitoring. For example, participants may record twice a day for 3 weeks or several times a day for 3 days.

The three main types of daily process designs are experience sampling, EMA, and daily diary methods. The Experience Sampling Method (ESM) was devised to study “the subjective experience of persons interacting in natural environments” (Csikszentmihalyi & Larson, 1987, p. 526). ESM designs utilize a random, signal-contingent schedule; participants are signaled (e.g., beeper) when to record. After being signaled, participants in ESM studies record such things as what they are doing or how they are feeling, either on a brief worksheet or directly into a palmtop computer. Similar to ESM, the EMA method (Stone & Shiffman, 1992) seeks to obtain information from participants about the structure of their everyday life. Like ESM, EMA employs a random, signal-contingent schedule. EMA makes use of recent technological advances and has participants complete assessments on computers. In addition to recording their current setting and experience (e.g., mood), participants in EMA studies often provide physiological readings (e.g., heart rate) or biological samples (e.g., saliva).

In contrast to both ESM and EMA research, in daily diary studies participants usually record on a fixed interval schedule. Diaries can be open-ended and unstructured, but most research utilizes a structured diary format or a combination. A structured diary package usually contains a number of identical booklets, typically at least one for each day of the week. Participants return completed diaries on a regular basis, daily or weekly (usually via mail). All three daily process methods focus on exploring phenomena that are assumed to change over time. Daily diary studies usually obtain more complex information from participants as participants

spend 5 to 10 minutes on average filling out a diary compared with ESM or EMA procedures. Daily diaries are less intrusive than ESM and EMA procedures because participants have more control over when and where they choose to complete the measures. More frequent and intrusive methods put more demands on participants, which may lead to non-compliance and attrition. Relative cost also makes a daily diary method more feasible for researchers due to the expense of equipment, software, and technical support involved in EMA and ESM procedures. The purpose of this study is not to compare daily process methods; information on choosing among different daily process methods can be found elsewhere (e.g., Stone & Shiffman, 1992).

### *Daily Diary Research*

Proponents of daily process methods (e.g., Csikszentmihalyi & Larson, 1987; Tennen et al., 2000) have lamented the slow move towards more within-person or idiographic research (and away from a reliance on between-person or nomothetic designs). In their 1992 chapter on daily diary research, DeLongis et al. concluded that daily diaries were used in a limited number of social science domains: mood (e.g., Marco, Neale, Schwartz, Shiffman, & Stone, 1999), common stressful events (e.g., Smith, Leffingwell, & Ptacek, 1999), menstrual cycle symptomatology (e.g., Freeman, Derubeis, & Rickels, 1996), health and illness behavior (e.g., Sherliker & Steptoe, 2000), personality (e.g., Cimboric-Gunthert, Cohen, & Armeli, 1999), and clinical issues such as therapeutic outcomes and basic clinical processes. Although daily diaries are more prevalent in the above areas, a 2002 search of both medical (Medline; Ovid Technologies, 1998) and social science (PsycInfo; SilverPlatter Information, 1997-2002) databases reveals a growing number of studies using this method; a search of the phrase *daily diary* on PsychInfo (SilverPlatter Information, 1997-2002) returned no hits for the years 1902 to 1990 and 19 hits for the years 1991 to 2002. For example, daily diaries have been used to explore sexism (e.g., Swim, Hyers, Cohen, & Ferguson, 2001), alcohol use (e.g., Armeli, Tennen, Affleck, & Kranzla, 2000),



parental engagement (e.g., Almeida, Wethington, & MacDonald, 2001), and sexual functioning (e.g., Michelson, Bancroft, Targum, Kim, & Tepner, 2000). Although the bulk of daily process research is conducted with adults, a number of diary studies have been carried out with children and adolescents (e.g., Gil, Porter, Workman, Sedway, & Anthony, 2000).

In addition to being used as research tools, daily diaries are also used for clinical purposes. Self-monitoring can provide clinicians with baseline information for assessment purposes. Diaries may also be used to monitor change, and as therapeutic tools in and of themselves (e.g., Greenberg & Padesky, 1995). As Bornstein, Hamilton, and Bornstein (1986) state: "It has been amply demonstrated that systematic observation of behavior may lead to problem identification and remediation. For these reasons, self-monitoring techniques have been increasingly used in therapeutic situations" (p. 178). Given the potential for self-monitoring (i.e., daily recording) to affect change the issue of reactivity is far from trivial considering the growing use of daily process research.

#### *Daily Diaries: Stress and Coping Processes*

The present study focused on reactivity as a consequence of daily self-monitoring stress and coping processes. As such, before exploring the issue of reactivity to self-monitoring further, I provide a brief overview of the characteristics of daily diary studies that focus on stress and coping processes. This overview provides a summary of the types of variables studied and similarities and differences among the studies. First, it is important to review the relevance of the daily diary method for the study of stress and coping.

A number of researchers (Affleck et al., 1999; DeLongis et al., 1992; Eckenrode & Bolger, 1995) have elucidated the advantages of utilizing daily diaries to study the stress and coping process. First, daily process designs are consistent with current conceptualizations of stress and coping as an evolving process (Tennen et al., 2000). Because daily diaries repeatedly

measure variables of interest, they are appropriate to study change over time. Second, daily diaries can increase the reliability and validity of self-report data (DeLongis et al., 1992). Because data are collected close to the advent of the phenomena, the chances of forgetting and biased recall are lessened. Third, diaries tap into the participants' everyday thoughts, feelings, and behaviors, thus strengthening the ecological validity of the measures (DeLongis et al., 1992). Finally, compared with more expensive and intensive procedures (e.g., EMA), daily diaries are less costly for researchers.

In the following section, I provide an overview of a selection of daily process studies in order to compare the present study with what is typical of daily diary studies on stress and coping processes. Studies that examined stress and coping processes on a daily basis using healthy adult samples were identified (studies focused on children or adolescents were excluded). Only research published in journals was included (e.g., dissertations were excluded). As well, studies that focused on specific health-related concerns (e.g., chronic pain, diabetes) were excluded. Studies that used EMA or ESM methods were also excluded because self-report, pencil and paper methods of collecting daily information are still the most commonly use method. Relevant research was identified through a number of strategies. The PsycInfo database (1984 to 2002) was searched using the search phrase *(stress or coping) and (diary or diaries or reports) and daily*. The reference lists of relevant articles were also examined for possible additional research. The final sample of diary studies overviewed was 36. It should be acknowledged that the present selection of daily diary studies is not an exhaustive list.

The 36 diary studies identified were diverse (for a description of the characteristics of each of these studies, see Appendix A). Most studies focused on daily stressors/hassles (64%), 20% focused on interpersonal stressors, 8% focused on academic stressors, and 8% focused on work-related stressors. The sample sizes ranged from 20 (e.g., Jones & Fletcher, 1996) to 741 (e.g.,

Grzywacz, Almeida, & McDonald, 2002). The most frequent sample size was 96 whereas the mean was 116. The duration of recording also varied greatly among the studies. In one study (Stone, 1987), participants completed diaries over the course of 84 to 112 days. In contrast, in Repetti's (1993) study, participants recorded over 3 consecutive days. The mean number of days of recording was 26, whereas the most frequent number of days was 14. The majority of studies (94%) had participants record once a day. This is in contrast to ESM and EMA methods in which participants usually record more frequently. For example, using the EMA method Marco et al. (1999) had participants record every waking hour over a period of 48 hours.

Although the present review was restricted to the area of stress and coping, the measures in diary studies were not limited to coping inventories and stress event checklists. Variables included alcohol consumption (Armeli, Carrey, Tennen, Affleck, & O'Neil, 2000), neuroticism (David, Green, Martin, & Suls, 1997), physical health (Hahn, 2000), and daily activities (Sheldon & Ryan, 1996). Depending on the research focus, participants recorded their behaviors, thoughts, and/or emotions, as well as situational and contextual factors (e.g., where they were, who else was involved). Though each of the 36 studies focused on different research questions and therefore utilized different measures, there were a number of similar participant characteristics and phenomena assessed. Most of the studies measured particular personality characteristics (e.g., autonomy, social support), the most common being neuroticism (19%) and depression (17%). Not surprisingly most diaries asked participants to complete measures of daily events/stressors and coping.

In summary, although these diary studies exhibited considerable diversity, there are a number of commonalities among them. First, all of the studies used self-report measures, meaning that participants reported on their own behavior. As well, the majority (94%) had participants record in pencil and paper diaries (one study used telephone "diaries" and one used a combination

of pencil and paper measures and palmtop computers). Second, 29 (81%) studies had mixed male and female samples; 4 (11%) had all male, and 3 (8%) all female samples. Finally, there was little ethnic and cultural diversity among the 36 daily diary studies. Most of the samples were predominantly Caucasian (94%).

The characteristics of the present data set used for the present study were consistent with a “typical” daily process study focused on the stress process. Therefore, the data set was appropriate to explore the issue of reactivity to daily diary methods. Participants recorded on paper and pencil diary forms over 15 consecutive workdays. The sample was predominantly Caucasian, healthy, and was employed. As well, the measures were not unlike measures used in the majority of the 36 daily diary studies. There were two differences between the present study and a typical daily diary study of stress or coping. First, participants completed diaries twice a day, rather than once. Second, the study had an all female sample, as opposed to a mixed sex sample. However, the data was representative of most daily diary studies on the stress process in terms of duration of recording, measures used, and ethnicity.

### Self-Monitoring

Daily process designs usually involve participants’ self-reports of their own behavior and/or internal states either as they occur or soon after their occurrence, a procedure known as self-monitoring. Cone (1999) defines self-monitoring as “the act of systematically observing and recording aspects of one’s own behavior and internal and external environmental events thought to be functionally related to that behavior” (p. 411). Self-monitoring involves two component responses.

First, the client must discriminate or notice the occurrence of the target behavior. This may be an action, thought, or feeling. Second, the client must produce some record of the occurrence as well as any additional information (e.g., intensity ratings or antecedent stimuli) that is relevant to the particular goals of assessment. (Korotitsch & Nelson-Gray, 1999, p. 415)

These responses may occur in close succession or may be separated by a period of time if target behaviors are recorded at intervals.

### *Reactivity to Self-Monitoring*

In considering the use of daily process methods to study the stress and coping process, the existing body of research and theory on self-monitoring is of relevance. Two key issues surface from a review of the self-monitoring literature. The first concerns the accuracy of self-report data derived from self-monitoring procedures. The second concerns reactivity, one of the possible difficulties arising from daily process procedures. Reactivity refers to the potential for self-observation and reporting to have an impact on the participant, potentially affecting the very topic under investigation (Bornstein et al., 1986).

Researchers have tended to focus on the issue of accuracy when discussing self-monitoring as a means of assessment, and reactivity when self-monitoring is used as an intervention or component of treatment (e.g., Bornstein et al., 1986; Korotitsch & Nelson-Gray, 1999). However, the two concerns are related; if self-monitoring is to be used for assessment where accuracy is of prime importance, reactivity needs to be minimal and if self-monitoring is used for treatment, reactivity should be maximized (in the desired direction). It should be noted that accuracy is not a necessary condition for reactivity (e.g., Bornstein et al., 1986; Hayes & Cavior, 1977). In addition, many of the variables related to accuracy are also related to reactivity. Though the following discussion focuses on the issue of reactivity, it is important to keep in mind that concerns about reactivity are related to issues of accuracy.

The issue of reactivity to self-monitoring procedures is of particular importance in considering daily process approaches to studying stress and coping. As Bornstein et al. (1986) note, "the very act of observing and recording one's own behavior may systematically influence that behavior" (p. 178). Indeed, it is due to reactive effects that self-monitoring is often used as an

intervention with numerous clinically relevant behaviors, such as hallucinations, insomnia, and suicidal ideation (Korotitsch & Nelson-Gray, 1999). In fact, self-monitoring is an integral part of many stress reduction programs (e.g., Stress Inoculation Training; Meichenbaum, 1985).

Although calling for more idiographic research, many stress and coping researchers, such as Tennen et al. (2000), voice their concerns about the reactivity of self-monitoring and its possible affect on findings, which could compromise conclusions and theories based on daily process data. Despite the potential for daily process methods to yield rich data on the complex processes involved in adaptation and coping, there is also the potential that such methods may actually alter the very processes under study.

#### *Theoretical Explanations of Reactivity*

Most research on reactivity has focused primarily on identifying variables affecting reactivity. Despite the body of research on reactivity to self-monitoring procedures, little work has been done on the mechanisms underlying reactive effects. However, some theories have been postulated and Nelson and Hayes (1981) provide an overview of three explanations for reactivity. Although it is beyond the scope of this paper to provide a comprehensive critique of these theories (for a more thorough discussion see Nelson & Hayes, 1981), a summary of these explanations (cognitive-behavioral, operant, extended operant) is provided.

*Cognitive-behavioral.* Nelson and Hayes (1981) label Kanfer's (1977) three-stage model of self-regulation a cognitive-behavioral account of reactivity. In this model, the first stage, self-monitoring, consists of the participant first observing the occurrence of the target behavior and then recording it. The second stage is an evaluative one, in which the participant compares the self-monitored behavior with an internal criterion for a given behavior. The final stage involves the participant either self-reinforcing, if the self-monitored response is favorably compared with the criterion, or self-punishing, if the self-monitored response falls short of the criterion. A

commonplace example may involve someone trying to lose weight. The person decides to self-monitor their level of daily exercise, with a goal of 30 minutes of exercise a day. They first observe engaging in activity and then may record the type of activity and time spent participating. Then they decide whether they have met their goal of 30 minutes, in which case they may tell themselves “Good job!” or have not met their goal, in which case they may berate themselves or add an extra 15 minutes to their exercise goal the following day.

*Operant.* The second explanation for reactivity is Rachlin’s (1974) operant model. The model suggests that environmental events control behavior. Self-monitoring and/or self-administered consequences cue the person to the external environmental consequences of engaging in the target behavior. Therefore, self-monitoring increases the salience of the relationship between the target behavior and the consequences. Using the daily exercise example, the person first recognizes and then notes when and how long they engage in exercise. They may or may not reward themselves for this behavior. Regardless of whether or not they reward or punish themselves, self-monitoring underscores the relationship between increased exercise and improved health (e.g., weight loss, body tone).

*Extended operant.* Nelson and Hayes (1981) provide a third explanation for reactivity. Building on Rachlin’s operant model, they expand self-monitoring to including not just recording the occurrence of the target behavior, but the whole self-monitoring procedure (e.g., self-monitoring device, training in self-monitoring, instructions from researcher/therapist). Nelson and Hayes’ (1981) expansion is an important one. In both Kanfer’s and Rachlin’s models, reactivity is initiated when the person records the occurrence of the target behavior. The inclusion of other contextual factors under the heading of self-monitoring procedures helps to explain the “occurrence of reactivity despite inaccurate self-monitoring, low frequency behavior, and unused self-monitoring devices” (Nelson & Hayes, 1981, p. 11).

All three models of reactivity stress the importance of self-awareness and consequences in accounting for change. Moreover, in all three models, self-monitoring leads to some form of self-reflection. Kanfer's model posits that self-reflection leads to self-imposed consequences, and in both Rachlin's and Nelson-Hayes' models, self-monitoring leads to awareness of contingencies and relationships among events. Each of the proposed models of reactivity imply that there may be differences in the nature of individuals' responses to self-monitoring because people differ in their perception of events and the context in which they are situated. Although the present study did not specifically address the mechanisms of reactivity, important questions the study did address were whether there were individual differences in responses to self-monitoring, and whether the research participants' perspectives might help us understand different forms of reactivity.

#### *Research on Reactivity*

Before discussing research on reactivity, it is worthwhile to keep a number of points in mind. First, as the author of the introduction to a Special Section on self-monitoring in the journal *Psychological Assessment* (1999) noted, research on self-monitoring blossomed for a brief period in the late 1960s through the early 1980s and has declined since then (Cone, 1999). This is evidenced by the fact that a recent review of the reactivity of self-monitoring procedures cites few studies later than 1977 (Korotitsch & Nelson-Gray, 1999). Thus, there has been little recent research on self-monitoring despite its widespread use as both an assessment technique and therapeutic intervention.

Second, reviews of the self-monitoring literature (e.g., Bornstein et al., 1986; Cone, 1999; Korotitsch & Nelson-Gray, 1999) revealed that much of the research on self-monitoring focused on overt, discrete behaviors, such as face touching, cigarettes smoked, or food intake, which are relatively easy to recognize and record. In particular, past research on self-monitoring tended to



focus on discrete, overt behaviors rather than covert internal states or multi-faceted situations or processes. Keeping in mind the goal of the present study, it is apparent that these findings may have limited applicability. Unlike behaviors such as eating or smoking, which have a clear onset and end and are easily defined and discerned, processes such as mood or coping are more difficult to define, do not always have a clear beginning and end, and involve a number of behaviors, feelings, and thoughts.

Finally, a good deal of the research on self-monitoring has been carried out with clinical populations (e.g., adults with eating disorders) or distinct groups (e.g., children with mental retardation) in institutional (e.g., laboratory or hospital) or classroom settings. In contrast, most daily process research was conducted with non-clinical, heterogeneous groups in daily living situations, which makes applying research on reactivity to self-monitoring at best limited and possibly inappropriate and misleading. In considering the complex, multi-faceted process of stress and coping, it may be difficult to draw parallels from the self-monitoring research.

#### *Variables Affecting Reactivity*

Research on the reactivity of self-monitoring comes from case studies, within-subject experiments, and between-subject and comparative designs. Reactivity is usually measured in terms of changes in the frequency of the target behavior. For example, in a study of daily caloric intake in which participants record number of calories consumed, reactivity would be evidenced by a significant number of participants' daily calories decreasing (or perhaps increasing) over the recording period. In their review of behavioral self-monitoring, Bornstein et al. (1986) grouped the variables identified as influencing reactivity into four main categories: antecedent, subject variables, behavior variables, and consequences. Table 1 shows these four categories and the variables subsumed under them.

Table 1

*Variables Affecting Reactivity*

Category	Variable
Antecedent	Salience and cue value
	Accuracy and self-monitoring training
	Schedule of self-monitoring
	Timing of self-monitoring
Subject Variables	Motivation
	Expectation of change
	Self-control skills
Behavior	Nature of target behavior
	Valence of target behavior
	Concurrent self-monitoring and environmental demands
Consequences	Goal setting
	Performance feedback
	Self-consequation
	External consequences

In the following section, the main conclusions from three reviews of the literature on reactivity to self-monitoring procedures are summarized (Bornstein et al., 1986; Fremouw & Brown, 1980; Korotitsch & Nelson-Gray, 1999). However, when a particular conclusion is especially relevant to daily diary studies of stress and coping, the original study is identified.

*Antecedent variables.* There is evidence that particular aspects of self-recording and/or the self-monitoring process influence reactivity by cueing the participant or drawing their attention to the behavior(s) of interest and the context and possible consequences of that behavior. For example, Broden, Hall, and Mitts (as cited in Fremouw & Brown, 1980) found that "the presence of a slip of paper on which an eighth grade girl was to record her study behavior 'when she thought of it' exerted considerable control over her study behavior even when no recording was done" (p. 211). Bornstein et al. (1986) also concluded that the more obtrusive the recording device, the greater the reactivity. However, the studies cited in support of the cuing potential of self-monitoring paraphernalia were either case studies or used small sample sizes and involved recording relatively simple behaviors (e.g., time spent studying), which makes it difficult to generalize to diverse populations and more complex monitoring situations.

There is evidence that self-monitoring does not need to be accurate to produce change; indeed reactivity can occur when the behavior has not even been recorded (e.g., Hayes & Cavior, 1977, 1980). As was noted earlier, self-monitoring involves two components. First the person must observe the occurrence of a particular phenomenon (e.g., behavior) and then record this occurrence. Research (e.g., Bornstein et al., 1986) showing that behavior change occurs in self-monitoring procedures in which no recording takes place suggests that, for reactivity to occur, it is not necessary for participants to faithfully record, or even record at all.

The schedule and timing of self-monitoring also has implications for reactivity. In general, the more frequent the recording, the greater the reactivity, with continuous self-monitoring showing the greatest reactive effects. For example, Harmon, Nelson, and Hayes (1980) found that self-recording throughout the day was associated with greater increases in self-recorded pleasant activities and decreases in depressed mood than recording once a day or less frequently. The importance of the rate, with increased frequency being positively correlated with behavior change

is one of the more consistent findings in the literature on reactivity to self-monitoring procedures (e.g., Frederiksen, Epstein, & Kosevsky, 1975; Mahoney, Moore, Wade, & Moura, 1973).

Research is equivocal on which leads to greater reactive effects, pre-monitoring (e.g., anticipated amount of calories consumed) or post-monitoring (e.g., actual number of calories consumed). Bornstein et al. (1986) cited a study of self-monitoring and weight reduction whereby the temporal dimension of self-monitoring (pre- vs. post-monitoring) interacted with the nature of the behavior recorded. Green (1973, cited in Bornstein et al., 1986) “found that pre-monitoring was more effective when calories were being recorded whereas post-monitoring was more effective when discriminative stimuli (e.g., time, place, activity, feelings, etc.) were being recorded” (p. 190). For some behaviors, self-recording before, rather than after, the target behavior leads to an increase in reactivity, possibly because self-recording may disrupt the target response and serve as an alternative response. However, it would seem that the level of reactivity of pre-recording versus post-recording might depend on the information being recorded.

Considering the findings from behavioral research on antecedent variables and reactivity suggests that infrequent recording may minimize reactivity to daily diary methods. In the present study, recording was completed only twice a day (noon and at the end of the workday), rather than with the occurrence of every stressor. With regard to the present study, possible cuing effects were less clear because no information was available on whether participants kept their diaries visible or not. Thus, the extent to which the daily diary method contributes to reactivity is unclear and warrants examination.

*Subject variables.* Fremouw and Brown (1980) note that, although “certain intellectual or physical abilities may be associated with greater reactivity, the current self-monitoring literature does not address this issue” (p. 212). There has been little research on how level of participant awareness, the interaction of developmental factors, and having the necessary skills to bring about

behavior change (assuming the target behavior is under the participant's control) influence reactivity. None of the reviews evaluated mentioned the influence of participant's mood on reactivity, despite evidence that self-focused attention (i.e., concentrating on one's own thoughts and feelings) has an effect on mood (e.g., Ingram, Cruet, Johnson, & Wisnicki, 1988), though perhaps these mood effects could be considered evidence of reactivity. Neither has there been any research on different personality dimensions (e.g., NA) and their possible influence on reactivity.

In general, the more motivated the participant, the greater the reactive effects. Korotitsch and Nelson-Gray (1999) noted that, "Participants with high motivation have typically been identified as those volunteering for treatment research or requesting help in changing the target behavior. Conversely, low-motivation participants would be those who agree to participate for money or research credit (p. 421)." Although both research participants and clients may be motivated, the nature of their motives may be different (e.g., participants are motivated to participate in order to contribute to scholarship and clients are motivated to reduce undesirable behavior or increase desired behavior). In the present study, participants were part of a research project focused on stress and coping processes in female clerical workers and were given a small gift for participation (e.g., bath oil). Though respondents' motivation was not formally assessed, anecdotal evidence suggested that many respondents felt that their participation would help other clerical staff and might have an impact on workplace practices.

Results are mixed as to the importance of participant expectations and their effects on reactivity. For example, Fremouw and Brown (1980) cite two studies: one found no correlation between weight loss and self-rated expectations for losing weight (Bellack, Schwartz, & Rozensky, 1974), whereas the other found that participants in a study of smoking who were told that participation in the study would decrease their rate of smoking showed significantly lower levels of smoking, compared with participants who were told that research participation may or

may not affect their smoking habits (Karoly & Doyle, 1975). Participants in the present study were told that they were participating in a research study and not a treatment or intervention study (e.g., they were not told that diaries would help with stress).

Research on subject variables thought to influence reactivity highlights the importance of considering individual differences that may influence how participants respond to self-monitoring. Though participants in the present study could be considered highly motivated, as they were willing to put in the time and effort to record twice a day for 15 consecutive workdays, this motivation may not translate into increased chance of reactivity. Given that participants in the present project were taking part in a research study, rather than a treatment study it is likely that as a whole, participants were not expecting participation to affect them personally (e.g., lessen stress). Although participants were motivated to participate, they were not necessarily expecting that participation would lead to change.

*Behavior.* There is mixed evidence as to whether nonverbal behaviors are more susceptible to reactivity than verbal behaviors. Hayes and Cavior (1977) found that self-monitoring face touching or verbal non-fluencies (e.g., “ums”) produced greater reactive effects than self-monitoring value judgments (e.g., good-bad). However, in a later study Hayes and Cavior (1980) failed to find differences in reactivity between self-monitoring eye contact, use of present tense verbs, or statements of feelings. Results from the Harmon et al. (1980) study on depressed mood mentioned earlier indicated that self-monitoring of pleasant activities led to greater overall reactivity than self-monitoring mood. It is important to note that in Harmon et al.’s study, participants monitored pleasant activities and not distressing events. In the present study participants self-monitored various aspects of their work stress, both overt (e.g., engaging in specific coping behaviors) and covert (e.g., mood) phenomena.

Findings regarding valence, or desirability of the target behavior, and its effect on reactivity are inconsistent. There is some evidence that positively perceived (either socially or intra-personally judged) self-monitored behaviors increase, such as eye contact (e.g., Hayes & Cavior, 1980), whereas negatively perceived behaviors (e.g., inappropriate verbalizations) decrease (e.g., Hayes & Cavior, 1977). However, not all studies on valence and reactivity have demonstrated these trends (e.g., Ewart, 1978). In the present study, participants were potentially self-monitoring both positively and negatively perceived behaviors. For example, though participants reported on stressful events, they also may have reported coping successfully, or conversely, may have reported not coping effectively.

Research seems to consistently show that, as the self-monitoring task becomes more complex (e.g., multiple responses are monitored), reactivity decreases (e.g., Hayes & Cavior, 1977, 1980). As well, complex self-recording appears to interfere with other demands and vice versa. For example, Israel, Raskin, and Pravder (1979) found that self-monitoring smoking behavior while reading impaired comprehension. Research on multiple-tracking, or monitoring more than one behavior (Hayes & Cavior, 1977, 1980), has been cited by stress and coping researchers (e.g., Affleck et al., 1999; Tennen et al., 2000) as evidence that reactivity may not be a concern in daily process research as such research usually asks participants to record multiple variables (e.g., mood, coping strategies, conflict). In the present study, participants self-monitored stressful events, coping behavior, mood, cognitive processes (appraisals), goals, and interpersonal interactions.

It is useful to give a brief overview of Hayes and Cavior's two experiments (1977, 1980) as they were cited to support the argument that reactivity was negligible in daily process research (e.g., see Tennen et al., 2000). The rationale being that daily process research on stress and coping processes involves self-monitoring verbal as well as non-verbal events and also requires

participants to report on multiple variables (e.g., mood, coping behaviors, workload). A closer inspection of the oft-cited work of Hayes and Cavior (1977, 1980) on multiple-tracking and reactivity suggests that such reassurances may be unfounded. In their 1977 study, Hayes and Cavior sorted 42 university students into seven experimental groups (3 males, 3 females in each group). These seven groups represented different variations of three self-monitored behaviors -- face touching, nonfluencies (e.g., "ums"), and value judgments -- thus participants in one group self-monitored only one behavior, a combination of two, or a combination of the three behaviors. In each group, participants interacted ("got to know each other") for 15 minutes (baseline phase), then self-monitored while interacting for 15 minutes (self-monitoring phase), and finally interacted without self-monitoring for 15 minutes (recovery phase). Reactivity was assessed by calculating ratio change scores for each target behavior: [score in the (self-monitoring or recovery) phase - score in the baseline phase] / [score in the (self-monitoring or recovery) phase + score in the baseline phase] and then conducting a 3 x 3 ANOVA with the recovery phase being considered a repeated measure of the self-monitoring phase in the analysis.

Multiple comparisons of the means from the self-monitoring and recovery phases using Dunn's procedure (Dunn, 1961) revealed that monitoring one behavior produced significantly greater reactivity than self-monitoring two behaviors ( $p < .01$ ) or three behaviors ( $p < .01$ ). There were no significant differences between self-monitoring two or three behaviors. For type of behavior, self-monitoring face-touching produced significantly greater reactivity than value judgments ( $p < .01$ ), but not nonfluencies (*ns*). Nonfluencies were significantly more reactive than value judgments ( $p < .05$ ).

In their 1980 follow-up experiment, Hayes and Cavior used an identical procedure to their 1977 study (baseline, self-monitoring, and recovery phases) and had the same number of participants ( $N = 42$ ) separated into seven groups. The difference between their two studies was



the target behaviors self-monitored. Unlike their 1977 study, which monitored negative behaviors, the three behaviors monitored in the 1980 experiment were presented to participants as being positive. In order to avoid a "floor effect" due to low rates of behaviors, it was hoped that by utilizing positively perceived behaviors, rates would increase. The three behaviors self-monitored were eye contact (5 seconds or more), present tense verbs, and statements of feeling (e.g., personal preferences).

To analyze the data, vocal measures were converted to rate measures and the looking measure was in frequency form. Like the 1977 study, the primary data for analysis were ratio change scores. The main analysis was a 3 x 2 ANOVA with the recovery phase being considered a repeated measure of the self-monitoring phase. Hayes and Cavior (1980) failed to find significant effects for type of behavior. Echoing their 1977 results, multiple comparisons using Dunn's procedure (Dunn, 1961) showed that monitoring one behavior was significantly more reactive than self-monitoring two behaviors ( $p < .05$ ) or three behaviors ( $p < .05$ ). Again, there were no significant differences between self-monitoring two or three behaviors.

On the surface, the work of Hayes and Cavior (1977, 1980) does seem to address and allay concerns raised by daily process researchers regarding the reactive effects of self-monitoring multiple phenomena. However, closer consideration of not only Hayes and Cavior's work (1977, 1980), but of research on reactivity to self-monitoring, suggests that further study of the issue of reactivity to daily process procedures is warranted. As with much of the research on reactivity to self-monitoring procedures, both studies (Hayes & Cavior, 1977, 1980) were experimental designs using a small number of undergraduate participants in a laboratory setting. The behaviors self-monitored were simple and discrete and monitored over a brief time period. It may be inappropriate to conclude from such research that findings from contrived settings may translate into more naturalistic settings. In the present study, participants were asked to complete a number

of measures assessing several variables (e.g., their mood, coping strategies, stressful events) twice a day for 15 consecutive workdays, a task that seems qualitatively different from self-monitoring face touching or present tense verbs for 15 minutes.

*Consequences.* Under the heading of consequences, Bornstein et al. (1986) included variables that draw participants' attention to the occurrence and outcome of target behaviors. Variables such as goal setting and feedback could be thought of as serving an evaluative function in that goals provide parameters for participants to aim for and feedback allows them to assess their progress towards goals (which may be either explicitly or implicitly stated).

In terms of goal setting and feedback and their effects on reactivity, results have been mixed. There is evidence that type of standards, for example, short-term (e.g., daily) versus long-term (e.g., monthly) goals may influence level of reactivity. Feedback provides a means of ascertaining progress towards achieving desired outcomes. Bornstein et al. (1986) concluded that "the importance of feedback may...depend on specific subject variables and is probably closely associated with the nature of the target behavior and the schedule of self-recording in terms of its information-conveying properties" (p. 197). There is the possibility that the diary forms provide information to participants about their experience and may draw their attention to the consequences of particular thoughts, feelings and actions. For example, participants might notice that they frequently deal with a particular type of stressor in a certain way and that they tend to feel badly afterwards. Again, it should be emphasized that in the present study daily self-monitoring was not an intervention. As such, the researchers did not set goals with participants nor did researchers provide participants with feedback regarding their stress and coping processes (e.g., analysis of coping strategies). This is not to say that it is not possible that certain participants may have found the daily diary process informative. Indeed, the present study explored participants' feedback regarding the experience of daily self-monitoring.

Goal setting and feedback are very much tied to the concept of reinforcement and, conversely, punishment (or lack of reinforcement). Consequences stemming from self-monitoring can be either self-imposed or external. Moreover, evidence suggests that “individual differences may interact with the implementation of self-reinforcement and that self-consequence may have to be specifically programmed or primed externally” (Bornstein et al., 1986, p. 198) to significantly influence reactivity. Research also revealed that not only does direct external reinforcement enhance and maintain reactive effects, but self-monitoring may also lead to external rewards by shaping behaviors in a way that elicits reinforcement. A consideration of the research on consequences and reactivity reveals that there are substantial individual differences in terms of the consequences of self-monitoring. Thus, in the present study, though the researchers did not put forward goals or provide feedback, filling out the diaries may highlight for participants particular dimensions of experience, which may in turn lead to self-reinforcement or behavior change.

In summary, variables that have been found to influence the reactivity of self-monitoring procedures have been identified. Throughout this section, I continue to emphasize the difficulty in drawing on research that focused on reactivity to self-monitoring procedures to inform daily process research on stress and coping. However, a number of findings in the literature on reactivity to self-monitoring procedures raise issues that are relevant to daily process methods.

### *Health Diaries*

Verbrugge (1980, 1989), in describing health diary research, refers to conditioning effects:

Because of participating in the study, their (the participants') perception of symptoms and their health behaviors actually may change, or the way they report symptoms and health behaviors may change...when present they (conditioning effects) influence levels of health reports and can cause trends to appear over the diary period. (Verbrugge, 1980, p. 87)

Verbrugge (1980) goes on to group conditioning effects into two types: sensitization and fatigue.

Sensitization occurs when participants become more aware of, and interested in, the phenomenon

under study--in this case, their health. Sensitization may lead participants to perceive symptoms more readily and may therefore lead to changes in their typical health behaviors. Fatigue, on the other hand, leads to drops in levels of reporting over time, as participants grow bored or tired with recording.

In examining both sensitization and fatigue effects in health diary research, Verbrugge (1980, 1989) proposed two strategies. Researchers can look for trends in aggregated data, an indirect indication of reactivity (i.e., conditioning effects). Alternatively, researchers can explicitly ask participants about their reactions to and experience of the diary process and then explore the relationship between these indicators and the diary reports.

Verbrugge (1989) used both of these strategies to assess reactivity in a sample of 574 Caucasian adults who participated in a 6-week diary study on health. After an initial interview, some of these participants completed a daily health record (DHR) for 42 consecutive days. This sample consisted of all participants who started the study and had a termination interview, but Verbrugge did not report how many of the 574 participants completed the study and how many dropped out (though they did have a termination interview). She also did not report the number of males and females in the sample. The DHR asked about general health status, symptoms of illness and injury, curative and preventative actions, mood, and unusual events. A termination interview was conducted at the end of the 42-day recording period. At the termination interview participants were asked "Did participating in this study make you notice your health problems more than before?" and "While participating in this study, did you handle your health problems differently than you usually would? For example, were you more likely to visit a doctor, cut down on your activities, or take medications?" These questions were designed to tap sensitization effects. Participants were also asked about fatigue effects, "Sometimes people get a little tired of

filling out the daily records and are not as careful or complete as usual. Did anything like this happen to you?"

Verbrugge described responses to the termination interview questions. Over half the participants (57%) said that during the 6-week recording period their awareness of their symptoms increased. Of that group, 73% said this sensitization lasted for the entire 6-week period (only 6% said this awareness was only at the beginning). Women reported being more sensitized than men (54% vs. 45%). Despite this increased awareness, only 6% of the participants indicated that they changed their health behaviors, with no gender differences in health behavior changes. In terms of fatigue, 19% said they grew tired of filling out the DHR. Men reported slightly more fatigue than women (20% vs. 18%).

As well as asking for participants' self-reports about changes in their health perceptions and behaviors, weekly rates of responses for particular variables were graphed and regression lines were estimated. Verbrugge (1989) provided graphs of the following variables: (a) number of symptomatic days per week (by gender), (b) number of bed days per week (by gender), (c) number of curative medical/dental care days per week (by gender), and (d) number of drugs per week (by gender).

Trends in the data revealed that over the 6-week period, symptom rates decreased whereas several health behavior rates increased. As time elapsed, participants reported feeling better physically, having more positive mood, and fewer unusual daily events. Compared with symptom variables, changes in health action variables were modest and showed greater fluctuation across the recording period. Participation seemed to spur men to take better care of their health through medical care and restricted activity. For women, drug use (e.g., vitamins) increased over the recording period.

In summary, Verbrugge (1989) suggested that trends in symptom reporting were due to sensitization. Participants reported that they became more aware of their physical health, but said that this awareness did not lead to behavior change. However, analysis of DHR showed that symptom rates decreased over time and Verbrugge suggested that as participants became more aware of their health, they concentrated more on major symptoms and their perception of minor ones decreased. Again, the DHR analysis was somewhat at odds with self-reports of little behavior change. Although increases in health behaviors were less pronounced than effects on symptoms, it is interesting that there was a dissonance between the DHR data and the participants' self-reported reactions to recording. This suggests that, when considering reactivity, it is useful to examine both the data provided by participants (i.e., study variables) and the self-reported perceptions of participants to the self-monitoring process.

Verbrugge's findings (1989) using daily health diaries suggested that there might be a discrepancy between participants' perception of the impact of recording and the data itself. Though participants said their health behaviors did not change, there was some increase in particular health behaviors (e.g., women's use of vitamins increased over the study period). Having participants' reflect on the effects of participation also helped to explain trends in the data. Participants said that as they became more sensitive to their physical symptoms, they began to pay less attention to minor problems over the recording period, which accounts for the decrease in symptom rates over time. Similar to Verbrugge's (1989) work, in the present study, both indirect measures of reactivity (e.g., daily mood) and participants' perceptions of the experience of daily self-monitoring were explored.

### *Reactivity of Pain*

Two recent studies specifically sought to measure the reactive effects of measurement on pain (Cruise, Broderick, Porter, Kaell, & Stone, 1996; von Baeyer, 1994). These studies stemmed

from contradictory findings about the effect of self-monitoring on participants' subjective experience of pain; some research had shown that self-monitoring decreased levels of self-reported pain, whereas other findings suggested self-monitoring increased perception of pain.

Both studies failed to find reactive effects to the measurement of pain. von Baeyer (1994) had 54 patients with chronic back pain (26 male, 28 female), randomly assigned to an experimental condition or the control group, complete either a short pain inventory (5-point categorical measure of pain severity and duration), a longer measure of pain (McGill Pain Questionnaire; Melzack, 1975), or a checklist of foods consumed during the day (control group), once a day for 8 consecutive days. Participants also completed pre- and post-test measures of pain. Data were analyzed using an ANOVA of post-test pain and distress scores with corresponding pre-test scores as the covariate. Results indicated no significant differences among the three conditions (long or short pain inventory and food checklist).

Cruise et al. (1996) used the EMA method and had participants with rheumatoid arthritis ( $N = 35$ ; 10 male, 25 female) complete measures of pain (7-point scale of momentary arthritis pain) and mood (Mood Adjective Checklist; Emmons & Diener, 1985) seven times a day for 1 week. Participants also indicated whether or not any significant events had occurred since their last record. For the analysis, researchers excluded participants who failed to respond to three or more of the seven prompts on any day of the study. Therefore, the final sample numbered 18 participants. Cruise et al. (1996) analyzed 15 variables for reactive effects: average daily pain intensity, 7 positive mood states, 6 negative mood states, and frequency of significant daily events. None of the 15 repeated measures ANOVAs computed to examine possible effects of time were significant. Though their method was more intensive than von Baeyer, Cruise et al. (1996) also failed to find reactive effects in ratings of pain, positive and negative mood, and frequency of significant events.

In considering alternative explanations for their findings, both von Baeyer (1994) and Cruise et al. (1996) suggested that perhaps reactive effects occur with the first measurement and stay consistent throughout the recording period. As well, perhaps certain types of pain are more reactive than others (e.g., chronic vs. acute). Both studies utilized patients with chronic pain whereas studies finding reactive effects often induced pain in the laboratory (e.g., cold pressor pain). Cruise et al. (1996) concluded that reactivity to the measurement of pain exists in laboratory or medical settings (where demand characteristics are thought to be high and pain is often acute) and that reactivity is not significant in naturalistic situations. This distinction between results found in experimental conditions versus applied conditions resonates with the earlier discussion regarding the appropriateness of applying the results of traditional research on reactivity to self-monitoring to daily process research on stress and coping.

Though not specifically addressing the issue of reactivity to daily self-monitoring of pain Affleck et al. (1994), in their study of mood-related and pain-related consequences of daily stressors among individuals with rheumatoid arthritis, suggested that one third of their participants exhibited significant linear declines in their daily levels of pain, negative mood, or stressful events; whereas a "substantial" number of participants reported increasing levels of pain, negative mood, or stressful events over the recording period. These ancillary findings again raise the issue of possible individual differences in participants' responses to daily self-monitoring and highlight the importance of going beyond looking only for overall trends in diary data.

Research on the reactive effects of pain recording failed to show that participants' pain (or perception of pain) was exacerbated by daily measurement. Both von Bayer (1994) and Cruise et al. (1996) concluded that when demand characteristics are high (e.g., in laboratory settings) research showed that measuring pain may increase participants' discomfort. This research, coupled with the research on reactivity to behavioral self-monitoring, suggests that the particular



context of self-monitoring (e.g., contrived settings vs. naturalistic conditions) may be an important determinant of reactivity. However, Affleck et al. (1994), using the daily diary method to study daily stressors impact on mood and pain, did report significant linear trends, although the nature of these trends was not uniform across the entire sample. The differential changes over time briefly mentioned by Affleck et al. (1994), suggests that daily self-monitoring may affect participants differently and these differences may not only be evident when looking at the sample as a whole; a third of their sample showed linear decreases in negative daily experiences whereas others reported an increase. Again, given the evidence that participants may react differently to daily self-monitoring the present study explored potential individual differences in reactivity.

*Assessing reactivity.* Most of the research on reactivity from the behavioral assessment literature has conceived, and thus measured, reactivity in terms of changes in behavior. However, assessing reactivity need not be limited to examining changes in behavior. For example, Harmon et al. (1980) explored changes in both self-reported daily pleasant activities and depressed mood due to self-monitoring. Other researchers have also used mood to assess reactivity (e.g., Affleck et al., 1994; Cruise et al., 1996). In the present study, mood was chosen as an appropriate indicator of reactivity because emotion is a central part of the stress and coping process in terms of appraisals, coping, and outcome (e.g., Moskowitz, 2001).

### Effects of Participating in Research

I have focused specifically on the potential for self-monitoring to affect the person who is recording, thereby changing the nature of the data recorded. I present four studies that explored the broader issue of an individual's experience of participating in research. Similar to Verbrugge's (1980) work, this research highlights the importance of eliciting information from participants about their perceptions of their research experience.

Although not mentioned in the literature on reactivity to self-monitoring, studies exploring the effects of research participation on individuals should be considered in a discussion of reactivity to daily process research on stress and coping. Reactivity implies that procedures that focus attention on the self may have an impact on the individual. A large proportion of research with human participants involves individuals paying attention to and reporting on their experience, whether overt (e.g., behaviors) or covert (e.g., thoughts and emotions). Despite the volume of research conducted with human participants, few studies specifically address the experience of research participants and explore the possible effects of research participation on participants.

A recent example of research in this area is Dyregrov, Dyregrov, and Raundalen's (2000) study on "Refugee Families' Experience of Research Participation." All participants had taken part in a study by the authors on how parents and children communicated about the decision to stay in Norway or return to Bosnia (Dyregrov & Raundalen, 1997). The original sample consisted of 20 Bosnian families, with the final number of participants being 74. Ages ranged from 5 to 73. Each member of the family took part in an in-depth interview (children below 12 years of age were interviewed by a child psychologist; adolescent and adult family members were interviewed by a sociologist). Parents also completed a background survey. In 17 of the 20 families, the adults needed an interpreter. The length of time spent with each family ranged from 3.5 to 6.0 hours. At the end of the interview participants were asked how they felt about participating in the study. Their responses led to the decision to do a follow-up study focusing on the participants' experiences before, during, and after the first encounter with the researchers.

In the follow-up study (Dyregrov et al., 2000), the researchers with the assistance of a interpreter, interviewed 9 of the 20 original families of Bosnian refugees who had now been living in Norway for approximately 45 months. The sample consisted of 11 women (ages ranging from 27 to 73), 5 men (ages ranging from 30 to 47), and 14 children (ages ranging from 6 to 19).

Every family member was interviewed using a semi-structured, in-depth interview that focused on their experiences around three time-related themes: gaining access, the interview-situation, and the time following the interview. After the interview, participants completed a brief questionnaire that rated the effects of the first, as well as the second interview on a Likert-type scale.

The authors of this study found support for previous research (e.g., Pennebaker, 1997) suggesting that participating in psychological research actually has a positive effect on participants. On a scale of 1 to 5, with 1 being *negative* and 5 being *positive*, all parents rated their experience as being a 4 or a 5. Adolescents, on average, rated the experience as a 4 and children from 8 to 12 years of age had a mean of 3.9. In the interviews, participants related that they felt the opportunity to share and express their feelings was extremely positive. Both political and social motives influenced the refugees' participation; they hoped that both professionals and people in general could learn from their stories. As well, almost all parents and adolescents experienced a sense of relief after taking part in the original interviews; although some participants felt sad and depressed initially after the interview. However, they said they were "back to normal" after a few days.

Dyregrov et al. (2000) considered their findings as offering evidence of the potential benefits of research participation. Participants reported that expressing their feelings was a positive experience. They hoped that others, both professionals and people in general, might learn from their stories and that the research might lead to a more open discussion of the issues, in this case the experiences of refugees. The authors were cautious about drawing conclusions that research participation could be considered therapeutic as they did not have information about the stability of the positive emotions experienced after participation.

The findings from a sociological study on mothers returning to work are similar to those found by Dyregrov et al. (2000). Brannen (1993) surveyed participants about their experience of

being part of a 3-year study on the effects of mothers returning to the work force after giving birth to their first child (the total number of mother/child dyads participating in the study was 243). The study involved four contact points: the first 4 months after the birth of the first child, a second contact approximately 6 months later, a third contact when the child was 18 months, and the final contact when the child was 3 years old. At three of the four contact points, participants were visited twice: one involved an in-depth interview with the mother; the other was a visit by a psychologist who assessed the children's development. As well, mothers and children were observed in the home on two separate occasions.

At the end of the study (Brannen, 1993), data were gathered on the mothers' research participation experience. Data were drawn from interviews with 40 of the women and surveys completed by 114 of the women. Similar to the Bosnian refugees, the mothers reported that being able to articulate their thoughts and feelings to another person was both welcome and beneficial. As one of the participants in Brannen's study reflected, "I could pour out all my feelings. I felt much better after she'd left. It was like a therapy session. Talking to someone detached. It also enabled me to question closely my reasons for doing things" (Brannen, 1993, p. 334). Participants also indicated that participation in the study heightened their awareness of their own situation as new mothers returning to the workforce, and to the situation for working mothers in general.

The studies of Dyregrov et al. (2000) and Brannen (1993), both on very different topics, one documenting the effects of research participation on Bosnian refugee families, the other on new mothers returning to work, echo the findings of other researchers who have noted the healing effects of expression (e.g., Pennebaker, 1997). Although the qualitative method employed in these two studies is very different from daily process designs, the findings do raise the possibility of research participation (whether oral or written) serving as a vehicle for self-expression and reflection and the possible effects of this articulation and introspection.

Hughes and Surra (2000) also examined the effects of research participation on participants. However, their focus was not on individuals, but on the effects of research participation on the relationships of premarital couples. The data for this study came from participants involved in a study by the authors on commitment in premarital relationships (Surra & Hughes, 1997). Participants were 60 premarital couples ( $N = 120$ ) recruited at a major Midwestern university; ages ranged from 17 to 26. There were three phases to this longitudinal study. The final sample, those who completed all three parts was 77 (females = 41, males = 36). Of those in the final sample, 44% ( $n = 34$ ) had broken up with their partner over the course of the study. In Phase 1, each partner was interviewed separately. Individuals completed questionnaires on their background, dating attitudes, and graphed the changes in the chance of marriage over the course of the relationship. Data were also collected on levels of love and trust, and individuals were asked to rate their current satisfaction with the relationship. During Phase 2, individuals were contacted monthly by telephone. They were asked whether or not they were still dating, whether they were dating anyone else, and what activities they had done as a couple over the past month. They were also asked about conflict within the relationship and rated their current satisfaction with their relationship.

Phase 3 took place one year after Phase 1. As well as being a replication of Phase 1, during Phase 3 participants completed a questionnaire designed for the study that measured the individual's perception of how being in the study affected their relationship. Participants were asked the following open-ended question: *Please briefly describe how participating in this study affected your relationship with (name)*. Participants who had broken up were asked: *Please briefly describe how participating in the study did or did not contribute to the breakup of your relationship with (name)*. They then answered 13 closed-questions (on a 9-point, Likert-type scale) assessing how participation affected their awareness and perceptions of their relationships.

Analysis of the open-ended responses yielded three overarching themes reflecting how participation in the study affected their romantic relationships: increased attention to relationship evaluation, influenced activities in their relationship, and minimal or no influence. Factor analysis of the questionnaire items revealed two factors: relationship-defining influence (eigenvalue = 2.6) and relationship-evaluating influence (eigenvalue = 1.34). Hughes and Surra (2000, p. 5) describe relationship-defining influence as “participation in the study or some aspect of the study assisted the participants in defining their relationship.” The relationship-evaluating influence refers to “an increase in the awareness of intrinsic relationship qualities such as strengths, problems, and overall quality as a result of study participation” (Hughes & Surra, 2000, p. 6).

Results showed that relationship-evaluating influence was significantly correlated with degree of participation,  $r = .24, p < .05$ , whereas the association between relationship-defining influence and participation was not significant,  $r = -.06, ns$ . As expected, the length of the relationship was not related to participation effects. Hierarchical regression analyses were used to explore the relationship between the two factors identified in the open-ended responses and relationship satisfaction. Relationship-evaluating influence was positively and significantly associated with relationship satisfaction,  $F[\text{delta}] (3,48) = 8.19, p < .001$ , but there was no significant association between relationship-defining influence and satisfaction with relationship,  $F[\text{delta}](2,49) = 1.13, p < .29$ .

In considering the results of their study, Hughes and Surra (2000) concluded that involvement in the study had three possible influences on participants: attention to relationship evaluation, effects on relationship activities, and indirect or no influence. As the authors suggest: “these three influences differ from one another mostly with respect to where the study drew respondents’ attention” (Hughes & Surra, 2000, p. 6). It is interesting that participants who indicated that participation heightened their awareness and focused their attention on their

relationship showed higher levels of relationship satisfaction over the 1-year study period. It would seem that an increased focus on their relationship was beneficial to some participants.

However, 4 participants indicated that participation in the study “brought up conflict” though 2 of these 4 also said that participation did not influence their relationships. In considering these cases, Hughes and Surra (2000) concurred with other researchers (e.g., Rubin & Mitchell, 1976) that participation may accelerate processes already operating in dating relationships. Therefore, Hughes and Surra’s findings suggest that participation may exacerbate tension in relationships or, conversely, lead to improved relationship quality, again highlighting individual differences in how participants respond to participation in research. The authors did not identify possible participant or relationship characteristics that may have lead particular people to respond to participation. In considering daily diary studies of stress and coping, it is possible that for some participants, self-monitoring of their stress and coping processes may lead to an increase in distress; whereas for others, this self self-focus may be beneficial. For this reason, the present study included an exploration of individual differences in reactivity and also examined participants’ perceptions of daily self-monitoring.

Daugherty and Lawrence (1996) were interested in assessing the short-term emotional reaction of participants after completing a package of psychological tests. Daugherty and Lawrence hypothesized that completing psychological measures would lead participants to focus on particular aspects of themselves and their experience. Based on research on self-focused attention (Scheier & Carver, 1977; Gibbons, Smith, Ingram, Pearce, Brehm, & Schroeder, 1985) that demonstrated that manipulating self-focused attention intensified emotional experience, Daugherty and Lawrence hypothesized that negative emotional reactions would be positively correlated with neuroticism and recent negative life experiences and that positive emotional reactions would be positively related to extraversion and recent positive life experiences.

Participants were 95 men, ranging in age from 18 to 24, from The Citadel, a male military college. Participants completed a psychological test package containing 14 standardized, self-report questionnaires and 150 demographic and behavioral questions (information on these measures was not provided). Immediately after completing the package of tests, the Lazarus Stress Questionnaire (Folkman & Lazarus, 1985) was given to assess current positive and negative emotional states and was used as an indication of emotional reactions to completing the test battery. Participants rated the extent to which they experienced each of 15 positive and negative emotions on a 6-point scale ranging from *not at all* to *a great deal*. To test their hypotheses regarding the association between emotional reaction to research participation and the personality traits of neuroticism and extraversion, the Eysenck Personality Inventory (Eysenck & Eysenck, 1975) was included. The Life Experiences Survey (Sarason, Johnson, & Siegal, 1978), which measures recent life events, served as a measure of recent positive and negative life events. Also included as a measure of interest was the Marlowe-Crowne Social Desirability Scale (MCSDS; Crowne & Marlowe, 1960) as a means of assessing a response bias of social desirability.

Daugherty and Lawrence (1996) analyzed the data using correlational and regression analysis. Overall, results on the stress measure indicated significantly more positive ( $M = 2.27$ ,  $SD = 1.06$ ) than negative ( $M = 0.94$ ,  $SD = 0.99$ ) emotional reactions,  $t(94) = 11.82$ ,  $p < .0001$ . Regression analyses using scores on the stress measure as the criterion and extraversion/neuroticism, positive/negative life events, and level of social desirability as predictors, showed that positive emotional reactions were predicted by a linear combination of extraversion ( $\beta = .25$ ,  $p < .01$ ) and positive recent life events ( $\beta = .24$ ,  $p < .01$ ). Conversely, a negative emotional reaction was predicted by neuroticism ( $\beta = .40$ ,  $p < .0001$ ) and recent negative life experiences ( $\beta = .21$ ,  $p < .03$ ). In addition, the authors found that social desirability was



significantly related to negative emotion ( $\beta = -.17, p < .05$ ), but not to positive emotion. This finding suggests that particular personality dimensions (e.g., neuroticism, extraversion) may influence how participants respond to participating in research.

### *Self-focused Attention*

In the present study, I did not examine self-focused attention *per se*, however, given the intuitive extension of self-focus stimuli to anything that recalls the self to the person (e.g., daily diary), a brief review of the literature on self-focused attention is warranted. Self-focused attention refers to the “act of directing one’s attention towards internal or covert aspects of the self, such as attitudes, standards, or feelings, rather than toward aspects of the external environment” (McFarland & Buehler, 1998, p. 1). In daily diary research, participants are usually asked to provide information on both internal processes and states and external situations and events.

Early studies of self-focused attention used external cues such as cameras and mirrors (e.g., Scheier & Carver, 1977) to encourage participants to self-focus. As Scheier and Carver (1977) explained, self-focus was “presumed to increase when a person confronts a stimulus that reminds him of himself” (p. 625). More recently, researchers have used less obtrusive means of directing participants’ attention inward. For example, Pyszczynski, Hamilton, Herring, and Greenberg’s (1989) self-focus manipulation involved having participants either write a story about themselves (self-focus) or about someone else (non self-focused), and Lyubomirsky, Caldwell, and Nolen-Hoeksema (1998) had participants in the self-focus condition concentrate on the causes and consequences of their depression (versus those who were distracted from their depression). In reflecting on these two examples of recent self-focus manipulations, it does not seem a stretch to consider as Daugherty and Lawrence (1996) did in their study of the short-term effects of participating in survey research, filling out psychological measures as a means of

focusing participants' attention inward. Given that daily process research on stress and coping asks participants to reflect on their own experiences, thoughts, and feelings, and recalling Scheier and Carver's (1977) presumption that stimuli that remind a person of themselves may lead a person to focus inward, it seems appropriate to contemplate the possibility that even brief measures, such as daily diaries, may cause participants to engage in the act of self-focusing.

There is an important distinction that is not always clear in the literature, between situational states of self-focused attention and a chronic, dispositional tendency to be self-focused. Fenigstein, Scheier, and Buss (1975) elucidate the distinction between trait and state self-focused attention:

The consistent tendency of persons to direct attention inward or outward is the trait of *self-consciousness* (original italics). *Self-awareness* (original italics) refers to a state: the existence of self-directed attention, as a result of either transient situational variables, chronic dispositions, or both. (p. 522)

When reading research on self-focused attention, it is vital to ascertain how self-focused attention is being operationalized as this has important implications for the meaning of the results. For example, William and Wiebe (2000) noted that though there is evidence that women are more prone than men to self-focus in *some contexts* (e.g., experimental manipulations using mirrors or cameras), there are no consistent findings of gender differences on *trait* measures of self-focused attention.

Some researchers have purported that self-focusing increases the accuracy of self-reports (Gibbons et al., 1985). In two studies with clinical populations, Gibbons et al. (1985) demonstrated that participants in the self-focus condition were more accurate in reporting the number of hospitalizations than the control group. However, in a review of literature on self-focused attention and accuracy, Silvia and Gendolla (2001) concluded that there is little direct evidence to support the contention that self-focusing leads to more accurate self-reports about

attitudes, affect, beliefs, and somatic states. This is not to say that “self-focus cannot conceivably increase the accuracy of self-judgments” (Silvia & Gendolla, 2001, p. 15), rather past research has yet to adequately test this.

The most relevant literature on self-focused attention, with regard to exploring reactivity in daily process research on stress and coping, comes from an exploration of the relationship between self-focused attention and mood. Early research on self-focused attention and mood found that participants in the self-focusing conditions were more responsive to their transient affective state (Scheier & Carver, 1977). Flowing from such early research on the heightening of mood, particularly negative mood, under experimental self-focusing conditions researchers began exploring the relationship between self-focusing and affect. Self-focused attention has been correlated to depressed mood in both clinically depressed and nonclinical samples (Ingram, Lumry, Cruet, & Sieber, 1987; Ingram & Smith, 1984; Smith & Greenberg, 1981; Smith, Ingram & Roth, 1985). A number of researchers have explored possible mechanisms underlying the association between depression and self-focus (e.g., Greenberg & Pyszczynski, 1986) and two models of depression give a central role to self-focused attention (Lewinsohn, Hoberman, Teri, & Hautzinger, 1985; Pyszczynski & Greenberg, 1987). Given the relationship between self-focused attention and depression, depression may be an individual characteristic that might influence level of reactivity to daily diary procedures.

In order to examine the relationship between self-focus and mood, Wood et al. (1990) studied 40 male community residents using a daily diary design. Wood et al. examined the association between self-focus and negative affect (rather than depression *per se*), as well as between self-focus and specific negative affect other than sadness (e.g., anxiety, hostility). They also tested a number of hypotheses concerning the relationship between self-focus and coping responses.

The participants (average age was 44.95 years, *SD* not reported) were part of a larger study on daily life stress, coping, and health among middle-aged male community residents (Stone, Reed, & Neale, 1987). Participants in this sample had completed 84 or more days of recording. These participants completed the Daily Life Experience (DLE; Stone & Neale, 1982) booklet at the end of each day. The DLE inquires about events, moods, physical symptoms, and coping strategies.

Wood et al. (1990) found support for previous research demonstrating the association between self-focused attention and negative mood. Consistent with a previous study (Wood, Satzberg, & Goldsamt, 1990) self-focus was not correlated with positive affect. Using a daily process method allowed for both between-person and within-person analysis. Wood et al. (1990) failed to find a within-person association between self-focus and mood. To examine differences between persons, each person's average self-focus score and average negative and positive mood scores across the 30 days of reporting were calculated. The intraclass correlation coefficient (ICC) was then calculated among variables. Between-person correlations revealed a significant positive correlation between negative mood and self-focus ( $r = .35, p < .01$ ), as well as a positive association between self-focus and anxiety ( $r = .41, p < .005$ ) and feeling skeptical ( $r = .35, p < .01$ ). Self-focus was also significantly negatively correlated with direct action coping ( $r = -.30, p \leq .05$ ).

In summarizing their research, Wood et al. (1990) concluded:

Our findings suggest that the associations between self-focused attention and negative mood, between self-focused attention and coping, and between coping and negative mood occur at the between-subjects level. The same people who tend to be highly self-focused tend to respond to problems by ruminating and by failing to deal directly with them, and they also are the people who are most unhappy... The present results suggest that self-focus acts as a stable individual difference that is associated with stable differences in unhappy moods. (p. 9)

In terms of the present study, the research by Wood et al. (1990) suggests that daily self-monitoring does not lead to an increase in participants' levels of self-focus. This finding is also supported by Nezlek (2002) who reported that there were no significant changes (e.g., systematic increase) in daily self-awareness over the 3-week period of daily self-monitoring in a sample of 41 university students. Thus, concerns that daily self-monitoring may manipulate levels of self-focused attention, thereby increasing participants' responsiveness to their transient affective states may be unfounded.

Wood et al.'s (1990) findings support other research demonstrating an association between trait self-focused attention and negative mood (e.g., Ingram et al., 1987), and also suggest a relationship between trait self-focused attention and anxiety. Although self-focused attention was not assessed in the present study, the findings by Wood et al. (1990) highlight the importance of considering individual differences in how people respond to daily self-monitoring procedures such as daily diaries, particularly in terms of individual differences in NA and depression.

#### *Individual Differences in Reactivity: NA and Depression*

Traditional behavioral research on reactivity to self-monitoring focused on, first, whether or not self-monitoring affected the behavior being monitored, and second, how particular variables (e.g., antecedent, subject, behavior, consequences) affected the extent of reactivity. Indeed, most of the research on reactivity that I reviewed, whether from the field of behavioral

assessment, health diaries, or pain, sought evidence of reactivity by examining changes across the whole sample. However, findings of differential response to research participation suggest possible individual differences in reactivity to daily self-monitoring (e.g., Affleck et al., 1994; Daugherty & Lawrence, 1996). Though overall trends in the data would definitely raise concerns regarding reactivity, focusing only on overall trends may fail to identify particular participant characteristics that may cause individuals to react differently to daily self-monitoring. In the present study, NA and depression were explored as possible individual difference factors that affected participants' responses to daily self-monitoring.

NA is also known as the personality trait neuroticism (Watson & Clark, 1984). Watson and Clark describe individuals high in NA (compared with those low in NA) as more likely to experience distress in any given situation. Moreover, people with high NA tend to be inwardly focused and more willing to self-disclose. They are also particularly sensitive to minor failures, irritations, and frustrations and tend to magnify and ruminate on their mistakes. Larsen and Katelaar (1991), who used an experimental design, demonstrated that individuals high in NA were more reactive to negative mood inductions than those low in NA. Researchers have described people high in NA as being negatively emotionally reactive (Watson, Clark, & Tellegen, 1988) or having heightened negative reactivity (Cimboric-Guthert et al., 1999). This higher emotional reactivity, when describing individuals, suggests that NA may be a factor that influences how daily diary participants respond to self-monitoring. When participants high in NA focus on daily frustrations and irritations, their negative emotional reactions may be further heightened.

NA has been described as a general distress factor that is chronic in nature, which subsume a number of more specific syndromes, in particular anxiety and depression (Clark & Watson, 1991). The pervasive and over-arching nature of NA has been hypothesized to account for the moderate to high correlations between measures of NA, anxiety, and depression (Watson

& Clark, 1991). However, though anxiety and depression share a significant nonspecific component (NA), each syndrome has its unique features. In addition to exploring the personality dimension of NA and its effect on reactivity, in the present study depressive symptoms were also explored.

The major components of depression include: depressed mood (e.g., sadness), feelings of guilt and worthlessness, feelings of helplessness and hopelessness, changes in appetite, and sleep disturbances (Radloff, 1977). Individuals with depression have been described as having a more pessimistic explanatory style for negative events, characterized by internal ("It's my fault"), stable ("This always happens"), and global ("Everything is a mess") accounts for negative events (e.g., Burns & Seligman, 1991). Gibbons et al. (1985) found that self-focusing during a depressed mood enhanced the accessibility of negative thoughts. Thus, for individuals prone to depression, self-monitoring stressful experiences may lead to an increase in negative thoughts, which in turn might exacerbate negative mood.

The concept of rumination may be important when considering participants' responses to daily self-monitoring. "Rumination involves passively and repetitively focusing on one's symptoms of distress...and on the meanings and consequences of the distress" (Nolen-Hoeksema, Larson, & Grayson, 1999, p. 2). For participants with high levels of depressive symptomatology being asked to report on stressful events, as well as their coping behaviors and mood, may lead to increased rumination. Research has shown that distressed people who engaged in rumination show longer and more severe periods of depressive symptoms (e.g., Nolen-Hoeksema, Morrow, & Fredrickson, 1993).

Rumination has also been associated with trait self-focused attention. Individuals high in trait self-focused attention were more likely to ruminate in response to a stressful event than those low in self-focused attention (Wood et al., 1990). Although the present study did not include a

measure of trait self-focused attention, the association between self-focused attention and depressed mood (e.g., Ingram et al., 1987) suggests that depression may be an individual difference factor worth exploring with regards to reactivity.

Researchers who have reviewed the literature on reactivity have recognized the possibility that individual differences (e.g., intelligence, personality) might affect the reactions of participants to self-monitoring (Affleck et al., 1999; Fremouw & Brown, 1980). However, to date there has been no research that has addressed this issue. Therefore, in addition to examining overall reactivity, the present study explored individual differences (NA and depression) and their association with responses to research participation.

### *Conclusion*

Despite the increasing use of daily process methods to study the stress and coping process there has been little more than cursory examination of the possible reactions of participants to daily self-monitoring. In considering the different bodies of literature relevant to reactivity, a number of issues stand out. First, there is ample evidence that self-monitoring may lead to behavior change (Bornstein et al., 1986; Fremouw & Brown, 1980; Korotitsch & Nelson-Gray, 1999). However, applying these findings to daily diary methods is difficult as the types of variables monitored are dissimilar and the contexts surrounding self-monitoring different. Thus, in the present study, data from a daily diary study of stress and coping processes were used to explore reactivity. As well as examining daily data provided by participants, research suggests that it is also important to solicit feedback from participants regarding the research experience (e.g., Hughes & Surra, 2000; Verbrugge, 1989). This information may not only provide researchers with a more comprehensive understanding of reactivity, but may also reveal additional variables that predict or reflect reactivity. Therefore, as well as examining participants' data for evidence of reactivity, the present study explored participants' own perceptions of the impact of participation



and examined the association between experiences of participation and reactivity. Finally, it is highly likely that individual differences may influence whether, or to what extent, participants are impacted through daily recording (e.g., Affleck et al., 1999; Fremouw & Brown, 1980). In the present study, NA and depressive symptomatology were examined for their association with both participants' perceptions of the effects of participation and changes in daily mood.

## RESEACH QUESTIONS

Given the dearth of information on reactivity to daily process research, in the present study, I posed exploratory research questions, rather than specific hypotheses. These research questions were based on the concerns raised by daily process researchers (e.g., Affleck et al., 1999) and considered the literature on reactivity from the field of behavioral assessment, as well as research on the experience of research participants and the personal characteristics of NA and depressive symptomatology.

*Question 1.* Are there trends in the daily diary data that suggest reactivity?

- (a) To what extent does participants' daily mood (positive, negative, anxious, and depressed) change over the recording period?
- (b) To what extent do the frequency of stressors participants report change over the recording period?

*Rationale.* Reactivity refers to changes in the frequency of target behaviors that are assumed to be a result of self-monitoring. Several researchers have examined changes in mood as an indication of reactivity (e.g., Cruise et al., 1996; Harmon et al., 1980). Given that mood is a central part of stress and coping processes (e.g., Moskowitz, 2001), significant increases or decreases over the recording period in both daily levels of mood (positive, negative, anxious, and depressed) and reported number of stressors, would suggest reactivity or fatigue to daily self-monitoring of work stress.

*Question 2.* To what extent do participants who complete daily diaries (i.e., 15 days of daily self-monitoring, twice a day) change differentially over a one-month period in terms of anxiety, depressive symptomatology, and job and life satisfaction, compared with those who do not?

*Rationale.* To explore the impact of daily diary participation, participants who self-monitored daily were compared with participants who did not in terms of changes in anxiety, depressive symptomatology, and job and life satisfaction assessed one month apart. During that month, diary participants self-monitored twice a day for 15 consecutive workdays, the non-diary group did not. Although participants were not randomly assigned to groups, this comparison controls for the effects of daily recording.

*Question 3.* What do participants self-report is the impact of daily recording multiple aspects of workplace stress and coping?

- (a) To what extent do participants describe their overall experience as being positive, negative, or neutral?
- (b) To what extent do participants report that self-monitoring had a positive, negative, or neutral effect on their behavior?
- (c) To what extent do participants report that self-monitoring has a positive, negative, or neutral effect on their mood?
- (d) To what extent is there an association between valence (e.g., positive, negative, neutral) of experience, behavior, and mood?

*Rationale.* Previous research on the effects of research participation highlight the importance of eliciting respondents' perceptions of their research experience (e.g., Verbrugge, 1989). It is possible that participation may affect respondents in ways that are not evident in the data provided. Affleck et al. (1999) also suggest that participants' self-reports about the experience of self-monitoring may aid in formulating hypotheses about individual differences in responses to self-monitoring. As well, participants' self-reports of their experience may help to explain findings, or conversely, be at odds with trends in the data (Verbrugge, 1989). Thus, in

addition to an examination of participants' self-reports about how they are impacted by daily self-monitoring, by an examination of the relationship between responses, the degree of consistency can be determined. For example, to what extent do participants who report that self-monitoring had a negative effect on their behavior also report that self-monitoring had a negative effect on their mood?

*Question 4.* To what extent do participants who report that recording their stress on a daily basis is a positive experience change differentially, in terms of anxiety, depression, and job and life satisfaction, as measured before and after the daily self-monitoring period, compared with participants who feel recording their stress on a daily basis was either a negative or neutral experience?

*Rationale.* Building on Verbrugge's (1989) study in which she compared respondents' self-reported effects of recording in daily diaries to variables assessed by the diaries, in the present study respondents' perceptions of the effects of daily self-monitoring were examined for their association with changes in anxiety, depressive symptomatology, and job and life satisfaction. Satisfaction and distress were chosen as appropriate variables because it seems logical that if daily self-monitoring of work stress either increased or decreased participants' levels of stress this would be reflected in measures of distress and satisfaction.

*Question 5.* To what extent are NA and depressive symptomatology associated with how participants respond to participating in the diary study, both in terms of self-reported effects of participation and daily levels of positive, negative, anxious, and depressed mood?

- (a) To what extent is there an association between participants' levels of NA and depressive symptomatology (assessed at Time 1) and self-reported effects of participation (e.g., valence of experience, behavior, and mood).

- (b) To what extent do daily diary participants with higher (vs. lower) levels of NA and depressive symptomatology (assessed at Time 1) change differentially over time on daily levels of positive, negative, anxious, and depressed mood?

*Rationale.* Although it is important to examine overall evidence of reactivity (see Question 1), research from a number of disciplines suggests that individual differences may influence whether or not, and to what extent individuals react to daily self-monitoring. Findings from Daughtery and Lawrence's (1996) study indicated that neuroticism was associated with negative emotional reactions to filling out a battery of psychological tests. Moreover, there is evidence that individuals with high levels of NA are more likely to experience significant levels of distress and dissatisfaction and dwell on their failures and shortcomings (e.g., Watson & Clark, 1984). Thus NA is an important personal characteristic that may influence the impact of daily self-monitoring. Depression, evidenced by level of depressive symptomatology, may also be an important individual difference variable that affects reactivity. Depression is associated with a propensity to self-focus (e.g., Ingram et al., 1987) and both depression and self-focus have been associated with rumination (e.g., Nolen-Hoeksema et al., 1993; Wood et al., 1990). In turn, rumination may exacerbate depression (Nolen-Hoeksema et al., 1993). Thus, daily self-monitoring for individuals high in depressive symptomatology may lead to changes in mood.

## METHOD

### *Participants*

*Daily diary participants.* One hundred twenty participants started the diary study. Demographic comparisons between participants who completed 15 workdays of daily recording ( $n = 97$ ) versus those who dropped out ( $n = 23$ ) revealed few significant differences between the groups. However, diary participants had been in the workforce for significantly more years ( $M = 19.29$ ,  $SD = 8.12$ ) than dropouts ( $M = 15.30$ ,  $SD = 8.66$ ),  $F(1, 118) = 4.36$ ,  $p = .04$  and were more likely to be married than dropouts,  $\chi^2(1, N = 120) = 6.01$ ,  $p = .014$ . Appendix B provides additional comparisons on demographic information between individuals who dropped out of the diary portion and those who completed the diaries. Of the 97 who completed the daily diary portion, 23 were excluded from the present analyses because (a) more than 30% of their data were missing ( $n = 2$ ) or (b) they did not return the Effects of Participation Form ( $n = 21$ )<sup>1</sup>. A final sample of 74 returned all the diary materials.

The daily diary participants in the final sample ranged in age from 21 to 61 years old ( $M = 40.08$ ;  $SD = 9.30$ ). Sixty-four percent were married or living with a partner, and 42% had children. Sixty-two percent had at least some college or university education (e.g., 2 years college, bachelor degree) and 37% had technical training, high school education, or less. Eight percent had an annual household income less than 25,000 Canadian dollars, 31% between 26,000 and 40,000 Canadian dollars, 23% between 41,000 and 60,000, 19% between 61,000 and 80,000,

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<sup>1</sup> There were no significant demographic differences (number of years in workforce, number of hours worked per week, age, household income, marital status, parental status, education, country of birth) between the 74 participants whose data were used in the present study and the 23 participants who completed the diary portion but were not used in the present analysis.

14% between 81,000 and 100,000, and 5% greater than 100,000. The predominantly Caucasian (84%) sample also included 9% Asian, 7% First Nations, and 3% South Asian participants. Job classifications included clerical workers (43%), secretaries (26%), and administrative assistants (31%). The women had been in the work force for an average of 20.07 ( $SD = 8.31$ ) years and the majority of participants belonged to a union (76%). Over the 30 occasions, 78% of the women reported at least 10 work-related stressor events (ranged from 4 to 30).

*Non-diary participants.* After approximately 110 eligible participants began the daily diary study, subsequent eligible volunteers were assigned to the non-diary study<sup>2</sup>. One hundred nine participants were recruited for the non-diary portion of the study. Of these 4 dropped out<sup>3</sup> and 4 were excluded from the current analyses due to missing data. Thus, the final non-diary sample was 101. All participants (both diary and non-diary) completed at least two questionnaire packages one month apart<sup>4</sup>. There were no significant differences between the diary ( $n = 74$ ) and non-diary ( $n = 101$ ) groups on a number of demographic variables (number of years in workforce, country of birth, and level of education). There were, however, characteristics that were statistically different between groups.

The non-diary sample ( $n = 101$ ) was older ( $M = 43.93$ ;  $SD = 9.31$ ) than the daily diary

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<sup>2</sup> After approximately a dozen participants were assigned to the non-diary study, it was determined that a few more diary participants were needed, therefore approximately 6 to 10 more participants were assigned to the diary study before continuing to assign eligible volunteers to the non-diary study.

<sup>3</sup> These 4 participants did not complete the final portion of the study (Time 3). However, because only data from Time 1 and Time 2 were used in the present study, these 4 were included in the present analysis.

<sup>4</sup> Of the approximately 120 participants who started the diary study 19% ( $n = 23$ ) dropped out; whereas of the 109 who started the non-diary study, 4% ( $n = 4$ ) dropped out. Further comparisons between dropouts from the diary and non-diary study could not be conducted due to the small number of non-diary dropouts ( $n = 4$ ).

participants ( $M = 40.08$ ,  $SD = 9.30$ ),  $F(1, 173) = 7.31$ ,  $p = .008$ . The average number of hours worked per week was 38.46 ( $SD = 7.50$ ) for diary participants and 36.02 ( $SD = 3.81$ ) for women in the non-diary sample,  $F(1, 171) = 7.81$ ,  $p = .006$ . Daily diary participants were less likely to belong to a union than non-diary participants,  $\chi^2 (1, N = 175) = 6.57$ ,  $p = .01$ . Finally, Chi-square analysis,  $\chi^2 (1, N = 175) = 7.21$ ,  $p = .007$ , showed that non-diary participants were more likely to have children than diary participants. In sum, diary participants were slightly younger, worked more hours, and were less likely to be parents and members of a union. For further demographic information see Appendix B.

### *Procedures*

Participants were recruited from advertisements in newspapers, flyers posted at various job sites, and by networking. Female clerical staff interested in participating contacted the Stress and Coping Lab at the University of British Columbia. Callers were screened over the telephone to ensure they met the study criteria. Female respondents who met the following criteria were eligible: (a) did not supervise other workers, (b) were employed a minimum of 20 hours per week, and (c) were experiencing ongoing work-related stress. Initially, eligible volunteers were assigned to the daily diary group. After approximately 110 respondents began the diary study, an additional 109 respondents began the non-diary study.

In the daily diary group, participants completed a questionnaire package at Time 1, then completed diaries twice a day for 15 consecutive workdays, and filled out another questionnaire package one month after Time 1 (Time 2), and again 1 month later (Time 3). Non-diary participants only completed the questionnaire packages at Time 1, Time 2, and Time 3. The present study is concerned with exploring short-term reactive effects, thus data from Time 3 are not used.

Daily diary participants met with a research assistant at a convenient place (e.g., their



home) to complete an informed consent form and a questionnaire package (Time 1), which included demographic questions and assessed social support, job and life satisfaction, and personal characteristics such as attitudes, dispositions, and health. At this time, participants also completed a practice diary. The research assistant was available to answer any questions or concerns the participant had and to brainstorm potential barriers to completing the diaries. Participants began recording at noon on the next convenient workday. On each workday of the 15-day period, participants completed questionnaires concerning a specific stressor event, appraisals, coping strategies, negative emotional responses, and other work-related items, at noon, and at the end of the workday, either before leaving work, or immediately upon arriving home. Participants were instructed to: (a) miss the recording period entirely if they did not complete a diary within the specified time period, (b) complete the diary based on their experience for that morning or since the previous recording, (c) place the diary in an envelope and seal the envelope after completing it, and (d) mail in their responses at the end of each block of 5 workdays. Participants were telephoned twice a week as a reminder to complete the forms and to clarify any concerns. Each diary took approximately 5 to 10 minutes to complete.

A week after finishing their last diary and one month after Time 1, a research assistant contacted the participant reminding them to complete and mail back the second questionnaire package (Time 2). During this telephone conversation, the research assistant asked the participant to recall their most salient work stressor of the past month. After recording their stressor on the stress and coping measure, participants completed the appraisal and coping measures keeping their stressor in mind. The second questionnaire package included measures of primary and secondary stressor appraisals and work environment, as well as measures of personal characteristics such as mood and health. Participants also completed a brief, one-page questionnaire on the effects of self-monitoring daily. Participants mailed Time 2 material in a

stamped addressed envelope to the Stress Lab. One month later they were called and reminded to complete the third questionnaire package, which was similar to Time 2. After completing the third questionnaire package, participants received a small gift for their participation (e.g., bath oil, body lotion).

Non-diary participants were informed over the phone about the purpose of the study, the time commitment involved, that participation was voluntary, and were assured that all the information collected would be treated as confidential. Interested participants were then mailed a questionnaire package (Time 1), which contained a consent form, a set of questionnaires, and detailed instructions for completing the measures. Participants were instructed to fill out the consent form and the first questionnaire as soon as they received them. These were then mailed back in an enclosed stamped envelope. If this booklet was not received at the lab within 10 days the participant was given a follow-up call. One-month after Time 1, participants were contacted by telephone by a research assistant. At this time, they were asked to consider their most salient work stressor from the past month and to keep this stressor in mind as they completed the second questionnaire package (Time 2). This second package was returned to the lab via mail. The same procedure was completed one month later (Time 3).

### *Measures*

Only measures used in the present study are reported here.

*Anxiety.* Anxiety was measured using the 20-item trait anxiety scale of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). In the present study, data from Time 1 and Time 2 are reported. This scale measures general levels of anxiety as opposed to current anxiety state. Participants rate how they *generally* or *typically* feel on a 4-point scale ranging from 1 (*almost never*) to 4 (*almost always*). Nine items are reverse-scored because they reflect the absence of anxiety (e.g., *I feel content*). Summed scores range from low

anxiety (20) to very high anxiety (80). Over 20-day periods, the test-retest reliabilities for the trait anxiety scale ranged from .76 to .86 and internal consistency coefficients for adults ranged from .89 to .96 (Spielberger et al., 1983). Correlations between the STAI and other measures of trait anxiety ranged from .73 to .85, indicating a high degree of concurrent validity (Spielberger et al., 1995).

*Depressive symptomatology.* The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used to measure participants' levels of depressive symptomatology. In the present study, data from Time 1 and Time 2 are reported. The CES-D is a 20-item self-report scale that measures depressive symptoms on a 4-point Likert scale. The CES-D was specifically developed for use in studies of the epidemiology of depressive symptomatology. Participants indicate to what extent they experienced particular symptoms (e.g., hopelessness, trouble sleeping, crying spells) over the last week, ranging from 0 (*rarely or none of the time/less than one day per week*) to 3 (*most or all of the time/5-7 days per week*). Items 4, 8, 12, and 16 are reverse scored. The possible range of scores is from 0 to 60. Higher scores indicate more depressive symptoms. Radloff (1977) reported Cronbach alphas ranging from .84 to .94 and test-retest reliabilities from .51 (2 weeks) to .67 (4 weeks). The CES-D showed moderate correlations with other self-report measures of depression, ranging from .55 to .63 (Radloff, 1977).

In the present study, the CES-D was used as both a dependent variable and an independent variable. As an independent variable, diary participants ( $n = 74$ ) were categorized as having a high, moderate, or low level of depressive symptomatology on the CES-D by separating the sample into three approximately equal groups based on scores on the CES-D. Scores for the low group ( $n = 26$ ) ranged from 0 to 10, in the moderate group ( $n = 26$ ) from 11 to 21, and in the high group ( $n = 22$ ) from 22 to 48.

*Job satisfaction.* Participants' level of job satisfaction was assessed using the Hoppock

Job Satisfaction Scale (McNichols, Stahl, & Manley, 1978). In the present study, data from Time 1 and Time 2 are reported. This 4-item scale measures participants' satisfaction with their present job and how they believe they compare with others in terms of job satisfaction over the past month. Responses range from 1 (*extreme dissatisfaction*) to 7 (*extreme satisfaction*). Response scores are summed to derive a total score ranging from 4 to 28. Higher scores indicated greater job satisfaction.

The scale has been normed over a range of occupational categories, internal consistency alphas ranged from .76 to .89 (McNichols et al., 1978). The Hoppock Job Satisfaction Scale also significantly correlated with other, longer measures of job satisfaction (McNichols et al., 1978). Factor analysis supports the notion that the four questions tap the same underlying factor. In four different samples, this single factor accounted for 58% to 76% of the variance and was the only factor with an eigenvalue greater than one (McNichols et al., 1978).

*Life satisfaction.* The Life Satisfaction measure developed by Warr, Cook, and Wall (1979) was used to assess life satisfaction. In the present study, data from Time 1 and Time 2 are reported. This 8 item measure assesses both satisfaction with personal life (e.g., health, education, social and family life) and satisfaction with life style (e.g., housing, community, income, and leisure pursuits). Participants indicate on a 7-point scale ranging from 1 (*extremely dissatisfied*) to 7 (*extremely satisfied*) the extent to which they are satisfied with various aspects of their lives *at the present moment*. The 8 items are summed for a total score ranging from 8 to 56. Higher scores indicate greater life satisfaction. Long (1998) reported an alpha level of .79 for the measure in a sample of 214 female clerical workers.

*NA.* NA was assessed using the NA subscale of the Positive Affect and Negative Affect Scales (PANAS; Watson et al., 1988). The PANAS consists of two 10-item scales (PA and NA). The PANAS was completed by participants at Time 1 as a trait measure of NA. The NA scale is

made up of 10 mood descriptors (e.g., *irritable*, *upset*). Participants indicate on a 5-point scale, ranging from 1 (*very slightly*) to 5 (*extremely*) the extent to which the descriptor reflects their experience *in general*. Scores range from 10 to 50, with higher scores indicative of higher levels of NA.

Watson et al. (1988) calculated the internal consistency of the NA on student and non-student adult populations and reported an alpha of .87 for NA when used as a trait measure. The correlation between NA and PA was .17 and test-retest reliability over an 8-week period for NA was .71. The NA scale correlated positively with other measures of distress (Watson et al., 1988). For example, the NA scale showed moderate, positive correlations ranging from .56 to .58 with the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), and correlations ranging from .65 to .74 with the Hopkins Symptom Checklist (Derogatis, Rickels, & Rock, 1976).

In the present study, the NA subscale was used as an independent variable. Based on their NA scores diary participants ( $n = 74$ ) were divided into three approximately equal groups based on their scores on the NA at Time 1. In the low group ( $n = 25$ ), scores ranged from 11 to 17, in the moderate group ( $n = 27$ ) from 18 to 24, and in the high group ( $n = 22$ ) from 25 to 40.

*Daily positive and negative mood.* The PANAS was also used as a daily measure of positive and negative mood. In both the noon and end-of-workday diaries, participants indicated on a 5-point scale, ranging from 1 (*very slightly*) to 5 (*extremely*) the extent to which the 20 mood descriptors reflected their experience in the interval since completing their last diary. Sample adjectives from the PA scale include: *interested*, *strong*, and *active*. Watson et al. (1988) examined the internal consistency and reliability of the PANAS using student and non-student (adult) populations with differing temporal instructions. With the instructions to fill out the PANAS as reflecting their experience *for today*, alpha scores for the positive mood scale were .90

and .87 for the negative mood scale. The correlation between the negative mood and positive mood was  $r = -.12$ .

*Daily anxious and depressed mood.* Daily levels of anxious and depressed mood (i.e., state measures) were assessed twice a day (noon, end-of-workday) using the state anxiety and depression sub-scales of the revised State-Trait Personality Inventory (STPI; Spielberger, 1979). The state anxiety and depression scales have 10 items each. In considering the period since their last recording, participants respond to the 20 statements on a 4-point scale from 1 (*not at all*) to 4 (*very much so*). Four items on the anxiety scale are reverse scored (e.g., *I feel calm*). Five items on the depression scale are reverse scored (e.g., *I feel strong*). Scores on each scale are summed to yield a total score ranging from 10 to 40 (high levels of anxious or depressed mood).

Spielberger (1979) reported an alpha of .87 on state depression subscale and alpha ranging from .93 to .94 on the state anxiety subscale for a sample of women. The STPI (Spielberger, 1979) showed moderate correlations with measures of personality. The STPI state anxiety scale was positively correlated with the Neuroticism scale,  $r = .46$ , and negatively correlated with the Extraversion scale,  $r = -.16$ , of the Eysenck Personality Inventory (Eysenck, 1964) (Spielberger, 1979).

*Self-reported effects of participation.* At the end of the diary recording period, participants completed a brief, one-page questionnaire developed for the study, that asked about their experience of daily recording (Effects of Participation Form). This measure was developed to assess the potential ways daily self-monitoring may have affected participants. The daily diary participants were asked to reflect on how participation might have affected them in general, and specifically in terms of their behaviors and feelings at work. As well, participants were asked to record if the way they completed the diaries changed over time. In order to ascertain if participants were completing the diaries independently, they were also asked whether or not they

talked to others about the questions in the diaries. Items 1, 3, and 4 were used to explore the research questions posed in the present study. Items 2, 5, and 6 were used descriptively. The complete list of items on this measure were:

1. Are you aware of how the process of recording your stress on a daily basis might have affected you?
2. Did you find that over time, you changed the way you completed the form? (e.g., didn't really think about how you felt any more, completed them in a rote fashion; or the opposite – became more sensitive to how you felt and consequently thought more carefully about answers over time).
3. Did you find yourself behaving differently at work (or elsewhere) as a result of completing the forms?
4. Did you find yourself feeling differently at work (more stressed, less stressed) as a result of completing the forms?
5. Did you talk to others about the questions on the forms?
6. Is there anything we should know about regarding the impact recording on a daily basis has had on you?

After each question, participants were asked to explain their responses. Space was available for them to write several lines of response.

### *Data Analysis*

Quantitative data analyses were conducted using SPSS for Windows, version 10.0.

Preliminary data analysis included screening data for accuracy and missing data, and identifying outliers as a check for irregularities. Screening of Time 1 and Time 2 data revealed no missing data on any of the measures used in the present study. Further analyses of Time 1 and Time 2 data showed no outliers and skewness values of under two on all relevant variables. Results of

evaluation of assumptions of normality and homogeneity of variance-covariance matrices were satisfactory.

In terms of the daily diary data, approximately 2% (196/8880 data points) of the data were missing. Missing values were imputed by taking the median of the four nearest data points. In order to check for outliers, each participants' daily scores on each variable were summed and z-scores for these summed scores calculated. Outliers were considered to be high if scores were greater than half a *SD* from the next highest score. Using this criteria, no significant outliers were detected in the daily diary data set. Skewness values were under two on all daily variables. Results of evaluation of assumptions of normality and homogeneity of variance-covariance matrices were satisfactory.

*Content analysis.* Participants' written responses to items 1, 2, 3, 4, and 6 of the Effects of Participation Form were analyzed using content analysis. To establish interrater agreement, two raters (myself and a male research assistant with an undergraduate degree in sociology) were trained in the following steps. First, for each question, I read 30% of the responses and generated preliminary response categories. In order to arrive at only one code per respondent, in cases where more than one code could be given to a response, I coded only the first response. Then, I presented and described the proposed categories to another independent rater. Next, both of us coded a random selection of 10 participant responses, compared our categories, discussed any discrepancies, and modified the categories. The 10 randomly selected responses were then returned to the original set of responses. Then we coded all the responses independently and compared codes. Interrater agreement was then computed for each question. Interrater agreement was substantial (percent agreement ranged from 91% to 95%); Cohen's Kappa values ranged from .81 to .95. The remaining discrepancies between raters were resolved through discussion.

To provide contextual information, Items 2, 5, and 6 were analyzed. Item 5, *Did you talk*



*to others about the questions on the forms?* was scored as a dichotomous variable (*yes* or *no*) and summarized. Items 2 and 6 were analyzed using content analysis. Descriptive information on Items 2, 5, and 6 is provided at the end of the results section as ancillary data.

## RESULTS

### *Preliminary Analysis*

For clarity, descriptions of Time 1 and Time 2 data are presented first, then descriptions of the daily diary data. Time 1 and Time 2 data reflect more stable constructs (e.g., overall life satisfaction), whereas the diary data tap mood states.

Table 2 provides the means and standard deviations for Time 1 and Time 2 variables. Job satisfaction means and standard deviations were similar to those obtained by other researchers (e.g., Long, 1998; McNichols et al., 1978). The means for life satisfaction in the present study,  $M = 39.43$ ,  $SD = 7.24$ , were similar to those reported by Long (1998),  $M = 37.59$ ,  $SD = 8.01$ , for a sample of working women. The mean for depressive symptomatology was higher,  $M = 17.16$ ,  $SD = 11.00$ , than those from a community sample,  $M = 7.94$  to  $9.25$ ,  $SD = 7.53$  to  $8.58$  (Radloff, 1977). NA was also slightly higher in the present sample,  $M = 21.69$ ,  $SD = 7.47$ , than scores reported by Watson et al. (1988),  $M = 18.1$ ,  $SD = 5.9$ , for a mixed undergraduate and community sample. Anxiety scores were higher,  $M = 40.95$ ,  $SD = 10.71$ , than those reported by Ferirs, Frink, Galong, Zhou, Kacmar, and Howard (1996),  $M = 35.64$ ,  $SD = 11.07$ , for a sample of working adults. Higher scores in the present study on measures of depressive symptomatology, NA, and anxiety are to be expected, given participants were experiencing chronic work stress.

Table 3 shows the intercorrelations among Time 1 and Time 2 variables, respectively. At Time 1 and Time 2, life and job satisfaction were low to moderately correlated (ranging from  $r = .12$  to  $r = .43$ ). Both life and job satisfaction scores were moderately negatively correlated with depressive symptomatology and anxiety (ranging from  $r = -.52$  to  $r = -.69$ ). Finally, depressive symptomatology was moderately to highly correlated with anxiety (ranging from  $r = .68$  to  $r = .82$ ). Coefficient alpha was above .80 on all measures, with the exception of life satisfaction, which had reliability coefficients of .76 and .73 at Time 1 and Time 2, respectively.

Table 2

*Means, Standard Deviations, Reliabilities (Cronbach's Alpha) for Time 1 and Time 2 Variables for Diary and Non-diary Participants*

Variable	Possible range	Diary Participants <sup>a</sup>			Non-Diary Participants <sup>b</sup>		
		<i>M</i>	<i>SD</i>	$\alpha$	<i>M</i>	<i>SD</i>	$\alpha$
		Time 1					
Anxiety	20-80	40.95	10.71	.94	41.06	10.07	.91
Depressive Symptomatology	0-60	17.16	11.00	.92	15.89	10.86	.92
Job Satisfaction <sup>d</sup>	4-28	17.58	4.33	.86	18.96	4.65	.89
Life Satisfaction	8-56	39.43	7.24	.80	39.78	7.28	.76
Negative Affect	10-50	21.69	7.47	.89	20.52	6.89	.88
Time 2 <sup>c</sup>							
Anxiety	20-80	41.70	10.28	.92	40.14	10.42	.92
Depressive Symptomatology	0-60	17.57	10.30	.91	15.79	10.17	.91
Job Satisfaction	4-28	17.62	4.80	.88	18.67	4.88	.87
Life Satisfaction	8-56	38.80	7.56	.79	39.18	6.92	.73

<sup>a</sup>  $n = 74$ . <sup>b</sup>  $n = 101$ . <sup>c</sup> Measured one month after Time 1. <sup>d</sup> Significant difference between groups,  $p < .05$ .

Table 3

*Intercorrelations Between Time 1 and Time 2 Variables for Diary and Non-diary Participants*

Variable	1	2	3	4	5
Time 1					
1. Anxiety	—	.82**	-.28*	-.71**	.83**
2. Depressive Symptomatology	.68**	—	-.21	-.52**	.75**
3. Job Satisfaction	-.45**	-.26**	—	.29*	-.31**
4. Life Satisfaction	-.63**	-.60**	.41**	—	-.71**
5. Negative Affect	.63**	.55**	-.27**	-.41**	—
Time 2					
1. Anxiety	—	.80**	-.31**	-.67**	—
2. Depressive Symptomatology	.76**	—	-.25*	-.52**	—
3. Job Satisfaction	-.42**	-.28**	—	.12	—
4. Life Satisfaction	-.54**	-.59**	.43**	—	—

*Note.* Correlations for Diary participants ( $n = 74$ ) are presented above the diagonal and Non-diary ( $n = 101$ ) correlations below the diagonal.

\*  $p < .05$ . \*\*  $p < .01$

Because the present study was concerned with changes over time, Table 4 provides a sample of means and standard deviations for the daily measures taken at the beginning (Day 1) of the recording period, midway through (Day 8) and at the last day (Day 15) as opposed to providing the aggregated means and standard deviations for the 15-workday recording period. Scores on the daily measures of positive mood, negative mood, and anxious mood in the present study were similar to those reported by other researchers (e.g., Spielberger, 1979; Watson et al., 1988). However, daily scores on depressed mood (ranging from  $M = 18.29$  to  $18.90$ ,  $SD = 6.12$  to  $6.37$ ) were higher than those obtained by other researchers ( $M = 14.37$ ,  $SD = 5.89$ ) for a sample of undergraduate students (Spielberger, 1979). High scores on depressed mood for the present sample are not unexpected, as participants indicated that they were experiencing chronic work stress. Reliabilities (Cronbach's alpha) for all measures were well-above .80.

Rather than providing all correlations for variables over the 15 days, which would be overwhelming, or merely providing the mean correlations over the 15 days, which could possible obscure associations among variables, a sample of correlations among variables over 5 consecutive days was selected. Appendix C provides the correlations between the noon and end-of-workday measures of positive, negative, anxious, and depressed mood over 5 consecutive days (Days 6 through 10). Positive mood and depressed mood noon and end-of-workday scores within the same day were highly correlated (mean  $r$ s of .74 and .75, respectively). Negative mood and anxious mood exhibited lower within day correlations (mean  $r$ s of .51 and .65, respectively). Noon positive mood scores were virtually uncorrelated with end-of-workday negative mood ( $-.12$ ), but were slightly correlated with end-of-workday anxious mood ( $-.26$ ) and moderately correlated with end-of-workday depressed mood ( $-.38$ ).

Table 4

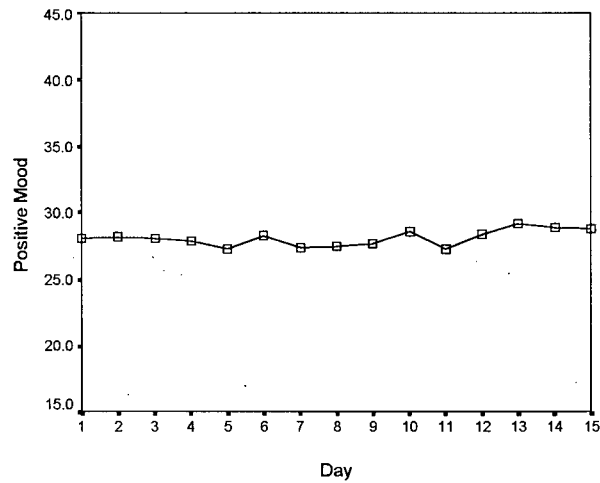
*Means, Standard Deviations, and Reliabilities (Cronbach's Alpha) for Daily Noon and End-of-Workday Variables (N = 74)*

Variable	Possible range	Day 1			Day 8			Day 15		
		M	SD	$\alpha$	M	SD	$\alpha$	M	SD	$\alpha$
Positive Mood (am)	10-50	29.07	7.66	.86	27.87	9.60	.93	28.98	8.37	.92
Positive Mood (pm)		27.24	8.50	.90	27.18	8.07	.89	28.66	8.05	.91
Negative Mood (am)	10-50	15.39	5.41	.86	15.49	6.45	.87	14.71	5.95	.90
Negative Mood (pm)		15.95	6.40	.86	15.96	7.05	.91	14.74	6.22	.90
Anxious Mood (am)	10-40	19.30	6.14	.90	19.66	5.97	.90	19.82	5.61	.89
Anxious Mood (pm)		19.41	6.27	.91	19.96	6.04	.91	19.82	6.58	.93
Depressed Mood (am)	10-40	18.29	6.33	.90	18.83	6.20	.90	18.53	6.37	.91
Depressed Mood (pm)		18.74	6.12	.89	19.47	6.17	.90	18.90	6.16	.93

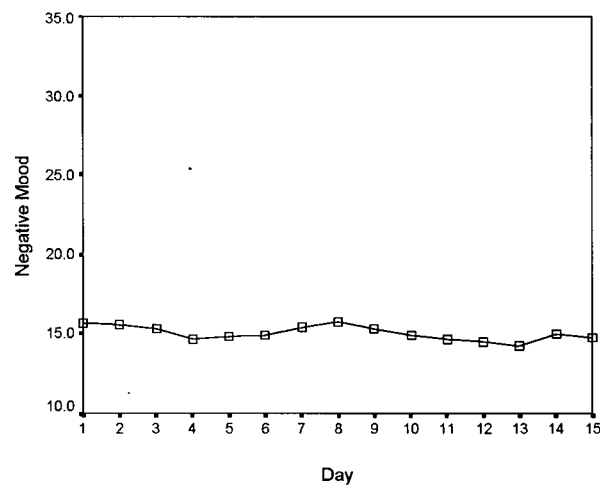
Appendix C also provides the correlations over 5 consecutive days, between noon measures of positive, negative, anxious, and depressed mood. In addition, correlations over 5 consecutive days between end-of-workday measures of positive, negative, anxious, and depressed mood are provided in Appendix C. For both noon and end-of-workday measures, correlations between consecutive day scores on the same variable, were moderate for depressed mood, positive mood, and anxious mood (mean  $r$ s of .60, .66, and .53, respectively). Correlations between consecutive days (both noon and end-of-workday) were lower for negative mood (mean  $r = .39$ ). Correlations among the variables (positive, negative, anxious, and depressed mood) measured at the same time period showed that, as expected, positive mood was weakly negatively correlated with negative mood (mean  $r$ s for day and end-of-workday, -.16 and -.19, respectively). Also, as expected, positive mood was moderately negatively correlated with anxious mood (mean correlations for noon and end-of-workday, -.32 and -.34, respectively), and depressed mood (mean correlations for noon and end-of-workday, -.52 and -.51, respectively). Not surprisingly, same time measures of negative, depressed, and anxious mood were moderately to highly correlated (ranging from  $r = .50$  to  $r = .86$ ).

### *Research Questions*

*Question 1.* The first research question focused on whether there were daily trends in the daily diary data that suggested reactivity. Figures 1 through 4 provide descriptive data of the daily means (average of noon and end-of-workday scores) over the 15-day recording period for positive, negative, anxious, and depressed mood.

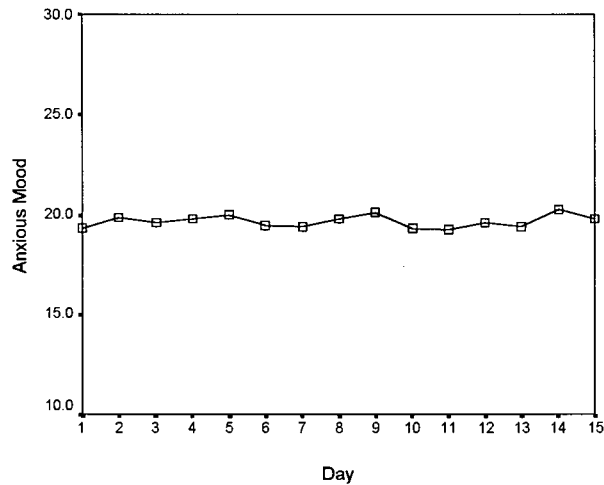


*Figure 1.* Means (average of noon and end-of-workday scores) of daily positive mood over the 15-day self-monitoring period for diary participants ( $n = 74$ ).

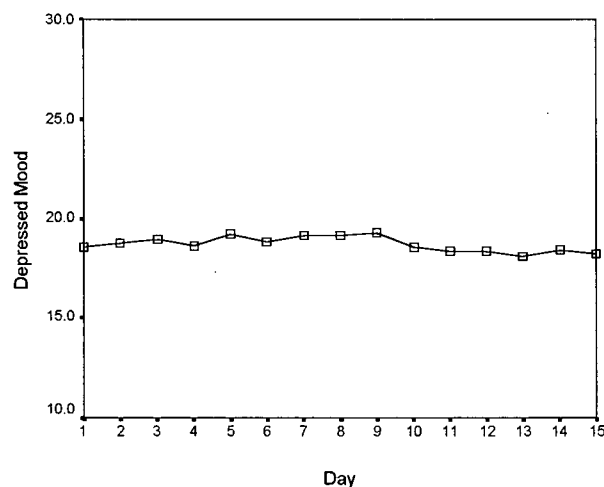


*Figure 2.* Means (average of noon and end-of-workday scores) of daily negative mood over the 15-day self-monitoring period for diary participants ( $n = 74$ ).





*Figure 3.* Means (average of noon and end-of-workday scores) of daily anxious mood over the 15-day self-monitoring period for diary participants ( $n = 74$ ).



*Figure 4.* Means (average of noon and end-of-workday scores) of daily depressed mood over the 15-day self-monitoring period for diary participants ( $n = 74$ ).

To answer the question, two steps were undertaken. First, as Step 1, the data were examined to determine whether participants' daily distress changed over the 15-day recording period. To examine daily changes in distress, a time-of-day (noon, end-of-workday)  $\times$  day (15) repeated measures MANOVA was conducted and was followed up with trend analyses. By structuring the analysis in this way, it was possible to explore daily changes, which was the

question of interest, as well as analyzing time-of-day effects. Daily positive, negative, anxious, and depressed mood were the dependent variables. Results indicated that there was no significant multivariate main effect for days,  $F(56, 18) = 1.40, p = .219$ , nor was the interaction between days and time-of-day significant,  $F(56, 18) = 1.55, p = .152$ . However, there was a significant multivariate effect for time,  $F(4, 70) = 7.40, p < .001$ . The follow up univariate test revealed that positive mood scores significantly differed between noon and evening,  $F(1, 73) = 7.40, p = .008, \eta^2 = .09^1$ . An examination of the means revealed that positive mood was lower in the evening ( $M = 27.81, SD = 6.43$ ), compared with the noon recording ( $M = 28.44, SD = 6.12$ ). Moreover, the univariate test for anxious mood approached significance,  $F(1, 73) = 3.69, p = .059, \eta^2 = .05$ , with anxious mood lower in the evening ( $M = 19.47, SD = 4.34$ ) than at noon ( $M = 19.86, SD = 4.13$ ). None of the trend analyses were significant. Results gave no indication that daily positive, negative, anxious, or depressed mood changed (e.g., increased or decreased) over the 15-day recording period.

As Step 2, the number of stressors reported was examined to determine whether there was a systematic change in the number of stressors reported over time. Thus, the number of stressors reported each week were summed for each participant. Based on the number of stressors reported the first week (10 occasions), participants were grouped into three approximately equal categories: those with few stressors (0 to 4), those with moderate amount of stressors (5 to 6), and those with a high number of stressors (7 to 10). Table 5 provides the means and standard deviations for each group for each of the 3 weeks.

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<sup>1</sup>  $\eta^2$  (eta squared) denotes the proportion of variance explained by a variable. Cohen (1977) provided the following classification of effect sizes for the social sciences: .01 as small, .09 as medium, and .25 or greater as large.

Table 5

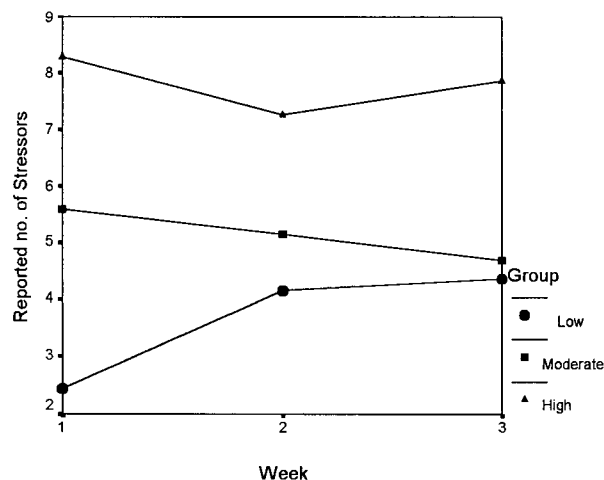
*Descriptive Information on Number of Stressors Reported Each Week*

Time	Initial Number of Stressors	<i>M</i>	<i>SD</i>
First Week	Low <sup>a</sup>	2.44	1.26
	Moderate <sup>b</sup>	5.60	0.50
	High <sup>c</sup>	8.29	1.08
Second Week	Low	4.16	2.48
	Moderate	5.16	1.99
	High	7.25	2.21
Third Week	Low	4.36	3.01
	Moderate	4.68	2.70
	High	7.88	1.98

<sup>a</sup> *n* = 25. <sup>b</sup> *n* = 25. <sup>c</sup> *n* = 24.

A 3 x 3 mixed model ANOVA, group (low, medium, high) x week (week 1, 2, and 3) with repeated measures on week, was performed to examine the differential rates of stressors reported for each of the 3 weeks by participants who had initially reported a low, moderate, or high number of stressors during the first week of recording, and was followed up with trend analyses. The results revealed a nonsignificant main effect for week,  $F < 1$ , and a significant main effect for group (low, moderate, high),  $F(2, 73) = 45.36$ ,  $p < .001$ ,  $\eta^2 = .56$ . This significant effect for group is to be expected as participants were grouped based on differences in the initial number of stressors reported. There was a significant interaction between week and group,  $F(4, 73) = 6.87$ ,  $p < .001$ ,  $\eta^2 = .16$ . As a follow up to the significant interaction, trend analyses revealed significant group by week effects, both linear,  $F(2, 3.461) = 8.27$ ,  $p = .001$ ,  $\eta^2 = .19$ , and quadratic,  $F(2, 2.217) = 4.68$ ,  $p = .012$ ,  $\eta^2 = .12$ .

As evidenced by a visual analysis of the three groups (see Figure 5), participants who reported a high number of stressors during the first week decreased in the number of stressors they reported in the 2<sup>nd</sup> week. Conversely, participants who reported a low number of stressors during the first week increased in the number of stressors reported during the second week. Participants in the moderate group consistently reported a moderate amount of stressors over the 3 weeks. The change in the number of stressors at week two could be interpreted as high and low groups regressing towards the mean. However, most of the change in number of stressors reported (increase, decrease) occurred for the second week and was not consistent over the 3 weeks of the recording period. Results from the second part of question 1 reveal that there was differential change over time between participants who initially reported a high number of stressors (7 or more) and those who reported a few (4 or less). Specifically, after week 1, the high group decreased the number of stressors reported and the low group increased in the number of stressors reported.



*Figure 5.* Average number of stressors per week for high, moderate, and low groups across three weeks.

*Question 2.* The second research question focused on whether participants who completed 15 workdays (twice a day) of daily diaries changed differentially over 1 month in terms of distress

(anxiety and depressive symptomatology) and satisfaction (life and job), compared with participants who did not take part in the diary portion of the study. Participants ( $n = 74$ ) who self-monitored for 15 workdays were compared with those ( $n = 101$ ) who did not complete daily diaries. Because unequal group sizes may lead to a violation of the MANOVA assumption of homogeneity of variance-covariance matrices, differences in standard deviations on outcome measures were examined and found to be small. Four dependent variables anxiety, depressive symptomatology, job and life satisfaction and were assessed for all participants one month apart. A group (diary, non-diary)  $\times$  time (Time 1, Time 2) mixed model MANOVA, with repeated measures on time, revealed no significant main effects for group,  $F(4, 170) = 1.19, p = .319$ , or time,  $F(4, 170) = 1.15, p = .336$ , or the group by time interaction,  $F(4, 170) = 1.17, p = .328$ . Thus, participants' levels of satisfaction and distress did not change differentially over the month for diary and non-diary participants.

*Question 3.* The third research question had two parts. The first focused on participants' reports about their experience of participating in the daily diary study and was concerned with participants' descriptions of their experiences of daily self-monitoring, specifically their (a) impressions of the overall experience of completing the diaries, and whether or not it impacted their (b) behavior and (c) mood. For each question (overall experience, changes in behavior, changes in mood), due to the small number of participants in some categories, the results of the content analyses were collapsed into three broad categories, reflecting no change, a positive effect/experience, or a negative effect/experience. Appendix D illustrates which initial categories within each question were combined.

Participants' responses about their overall experience of self-monitoring revealed that 59% of participants felt that daily recording was an overall positive experience, 26% felt daily self-monitoring was a negative experience, 8% reported an effect, but did not specify how

affected (i.e., “It had an effect”), and 7% reported they were not affected. The majority of participants (65%) did not think that daily self-monitoring had an effect on their behavior, 30% reported that daily self-monitoring had a positive effect on their behavior, whereas 5% felt that recording had a negative impact on their behavior. In terms of how participants felt daily self-monitoring affected their mood, 39% did not think their mood was affected, 31% felt recording had a positive effect (e.g., decreased stress), 26% said recording had a negative effect (e.g., increased stress), and 4% reported both positive and negative effects.

To summarize, participants’ open-ended responses revealed that overall, a little over half of the diary participants felt that daily self-monitoring was a positive experience. The majority did not feel that self-monitoring affected their behavior. Participants were more roughly dispersed in terms of whether or not they felt that daily recording had a positive or negative effect on their mood. Appendix D provides examples of participants’ responses to items 1, 3, and 4 of the Effects of Participation Form.

The second part of Question 3 examined the extent to which participants’ responses about the effects/experience of participation were consistent. For example, did participants who felt that completing the diaries lessened stress also report positive changes in their behavior? To this end, associations among the self-reported overall experience of daily self-monitoring (i.e., positive experience) and the self-reported effects on behavior (e.g., positive effect) and mood (e.g., positive effect) were explored using Chi-square analyses. Appendix E provides the contingency tables for categories of overall experience of self-monitoring (neutral experience, negative experience, positive experience, and unspecified experience), effect on behavior (no change, negative effect, and positive effect), and effect on mood (no change, negative effect, positive effect, and mixed effect). Due to small cells sizes, categories with less than 6 participants were dropped to allow for statistical analyses. Therefore, for overall experience, the categories of

positive and negative experience were retained, whereas the categories of neutral experience and unspecified experience were dropped from analyses. For self-reported changes in behavior, the no change and positive effect categories were retained and the category negative effect dropped. Finally, for self-reported changes in mood, the categories of no change, negative change, and positive change were retained, whereas the mixed effect (e.g., both positive and negative change) was dropped.

The Chi-square for self-reported changes in behavior by changes in mood was significant,  $\chi^2 (2, N = 67) = 7.47, p = .024$ . Table 6 provides the column percents for the contingency table for self-reported changes in behavior by changes in mood. Participants who expressed either no change or a negative change in mood were likely ( $\geq 73\%$ ) to report no change in behavior; whereas participants who reported a positive change in mood reported a positive effect on behavior slightly over half the time (52%). Thus, there was modest evidence of consistency among responses regarding self-reported changes in mood and changes in behavior.

Table 6

*Self-reported Changes in Behavior by Changes in Mood (N = 67)*

Behavior	Mood			N
	No Change	Negative Effect	Positive Effect	
No Change	83%	73%	48%	46
Positive Effect	17%	27%	52%	21
N	29	15	23	67

*Note.* Entries are column percents. Percentages rounded to nearest whole number.

The Chi-square examining self-reported overall experience by changes in mood was also significant,  $\chi^2 (2, N = 60) = 12.26, p = .002$ . Table 7 provides the column percents for the contingency table for overall experience by changes in mood. Participants who reported that

completing the daily diaries was a positive experience were likely to report a positive change in mood ( $\geq 91\%$ ); whereas participants who reported a negative overall experience reported a negative effect on mood slightly over half the time (59%). Thus there was evidence of consistency among responses regarding perceived overall experience and changes in mood.

Table 7

*Self-reported Overall Experience by Changes in Mood (N = 60)*

Mood	Overall Experience		N
	Negative Experience	Positive Experience	
No Change	25%	25%	20
Negative Effect	59%	41%	17
Positive Effect	9%	91%	23
N	17	43	60

*Note.* Entries are column percents. Percentages rounded to nearest whole number.

There was no significant relationship between overall experience of self-monitoring and changes in behavior, Fisher's exact test,  $\chi^2 (1, N = 59), p = .087$ , suggesting that there was little consistency among reports of overall experience and changes in behavior. Table 8 provides the column percents for the contingency table for overall experience of daily recording by self-reported changes in behavior due to self-monitoring.



Table 8

*Self-reported Changes in Behavior by Overall Experience (N = 59)*

Behavior	Overall Experience		N
	Negative Experience	Positive Experience	
No Change	81%	58%	38
Positive Effect	19%	42%	21
N	16	43	59

*Note.* Entries are column percents. Percentages rounded to nearest whole number.

In summary, there was some evidence that participants' self-reported responses to daily self-monitoring were consistent. Although Chi-square analyses showed no association among overall experience and changes in behavior, there was an association among change in mood and change in behavior. Participants who reported a positive change in mood also reported a positive effect on behavior approximately half the time (52%), and participants who reported no change or a negative change in mood were likely to report no change in behavior. As well, participants who reported an overall positive experience were very likely to report a positive impact on mood, whereas participants who reported a negative overall experience reported a negative impact on mood over half the time (59%).

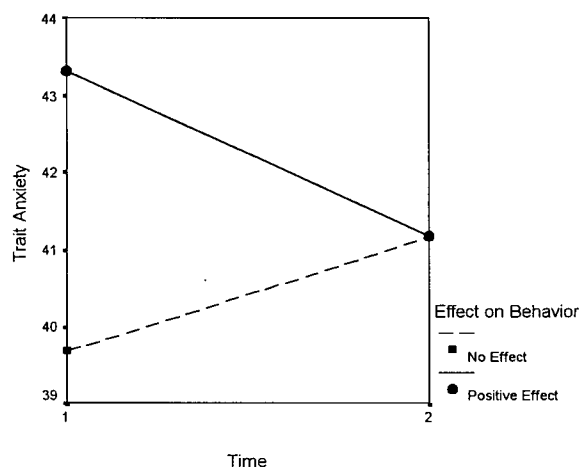
*Question 4.* The fourth research question focused on whether self-reported self-monitoring experience (e.g., overall experience, behavior, and mood) was associated with differential change over time in anxiety, depressive symptomatology, and job and life satisfaction.

To address this question, three mixed model MANOVAs were conducted. The first MANOVA explored whether self-reported overall experience was associated with differential change over time on anxiety, depressive symptomatology, and job and life satisfaction (assessed at Time 1 and Time 2). A group (positive experience, negative experience) x time (Time 1, Time 2)

mixed model MANOVA with repeated measures on time was conducted. The categories neutral experience ( $n = 5$ ) and unspecified experience ( $n = 6$ ) were dropped due to their small size; whereas the larger categories of positive ( $n = 44$ ) and negative ( $n = 19$ ) overall experience were retained. Although unequal group sizes may lead to a violation of the assumption of homogeneity of variance-covariance matrices, differences in standard deviations on outcome measures were examined and found to be small. Results showed no significant multivariate main effects for group,  $F < 1$ , or time,  $F < 1$ . The interaction between group and time was nonsignificant as well,  $F < 1$ .

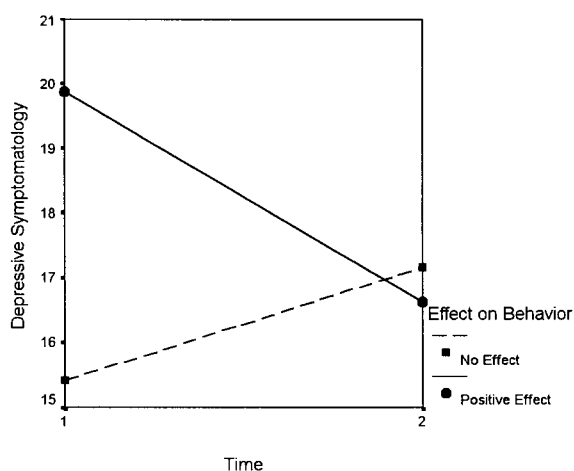
The second MANOVA explored the association of self-reported behavior change and differential change over time on the same dependent variables. A group (positive experience, no effect) x time (Time 1, Time 2) mixed model MANOVA with repeated measures on time was conducted. The category of negative effect ( $n = 4$ ) was dropped, whereas the larger categories of positive ( $n = 22$ ) and no effect ( $n = 48$ ) were retained. Although unequal group sizes may lead to a violation of the assumption of homogeneity of variance-covariance matrices, differences in standard deviations on outcome measures were examined and found to be small. Results showed no significant multivariate main effects for group,  $F < 1$ , or time,  $F < 1$ . However, the interaction between group and time was significant,  $F(4, 65) = 2.60, p = .044$ . An examination of univariate tests revealed significant group by time effects for anxiety,  $F(1, 68) = 5.12, p = .03, \eta^2 = .07$ , and depressive symptomatology,  $F(1, 68) = 5.07, p = .03, \eta^2 = .07$ .

A visual analysis (see Figure 6) reveals that participants who reported no change in behavior increased in anxiety from Time 1 to Time 2, whereas participants who reported a positive change in behavior decreased in anxiety.



*Figure 6.* Time 1 and Time 2 anxiety scores for participants who reported that daily self-monitoring had no effect on their behavior, compared with those who reported a positive effect on behavior.

A similar pattern emerged with regards to depressive symptomatology. Participants who reported no change in behavior increased in depressive symptomatology over the one-month period, whereas participants who reported a positive change in behavior decreased in depressive symptomatology.



*Figure 7.* Time 1 and Time 2 depressive symptomatology scores for participants who reported that daily self-monitoring had no effect on their behavior, compared with those who reported a positive effect on behavior.

The third MANOVA, a group (no change, positive effect, negative effect) x time (Time 1, Time 2) mixed model MANOVA with repeated measures on time, was conducted to examine differential change over time among participants who felt daily self-monitoring had no effect on their mood, versus those who felt completing the daily diaries had a positive, or a negative effect on their mood. The dependent variables were anxiety, depressive symptomatology, job and life satisfaction (assessed at Time 1 and Time 2). The category of mixed effect ( $n = 3$ ) was dropped, whereas the larger categories of positive ( $n = 23$ ) and negative ( $n = 19$ ) self-reported effect, and no effect ( $n = 29$ ) were retained. Although unequal group sizes may lead to a violation of the assumption of homogeneity of variance-covariance matrices, differences in standard deviations on outcome measures were examined and found to be small. Results showed no significant multivariate main effects for group,  $F < 1$ , or time,  $F < 1$ . The interaction between group and time was nonsignificant as well,  $F(8, 132) = 1.42, p = .20$ .

In summary, there was no evidence that different categories of participants' overall experience or mood were associated differential change over time on measures of anxiety, depressive symptomatology, job and life satisfaction assessed 1 month apart. However, there was evidence that participants who reported no change in behavior due to daily self-monitoring increased in anxiety and depressive symptomatology between Time 1 and Time 2, whereas participants who felt their behavior was affected in a positive way decreased in anxiety and depressive symptomatology over the one month period.

*Question 5.* The fifth research question has two parts. First, the association between self-reported impact of participation (e.g., overall experience, changes in behavior, changes in mood) and participants' levels of NA and depressive symptomatology were examined using three one-way MANOVAs. NA and depressive symptomatology were the dependent variables.

For the first MANOVA, the independent variable was change in overall experience and

included two groups: those who conveyed that daily self-monitoring was a positive experience ( $n = 44$ ) and those who felt recording was a negative experience ( $n = 19$ ). Results indicated that the MANOVA main effect for group was nonsignificant,  $F(2, 60) = 2.81, p = .068$ .

For the second MANOVA, the independent variable was change in behavior and included two groups: participants who reported that daily monitoring had no effect on their behavior ( $n = 48$ ) and those who felt their behaviors were positively affected by recording ( $n = 22$ ). Results indicated that the MANOVA main effect for group was nonsignificant,  $F < 1$ .

For the third MANOVA, the independent variable was change in mood and included three groups: participants who felt that daily self-monitoring did not affect their mood ( $n = 29$ ), affected their mood negatively ( $n = 19$ ), and affected their mood positively ( $n = 23$ ). Results indicated that the MANOVA main effect for group was nonsignificant,  $F < 1$ .

The second part of Question 5 examined the extent to which participants with low, medium, and high levels of NA and depressive symptomatology, changed over time on daily measures of positive, negative, anxious, and depressed mood. To explore individual differences that may account for differential responses to daily self-monitoring over the 15-day recording period, two mixed model group (low, moderate, high)  $\times$  time-of-day (noon, end-of-workday)  $\times$  days (15) MANOVAs with repeated measures on the last two factors, were conducted. The dependent variables were daily levels of positive, negative, anxious, and depressed mood. For the first MANOVA the independent variable was NA, whereas depressive symptomatology was the independent variable for the second. In addition, with each MANOVA trend analyses were conducted to examine significant patterns (linear or quadratic) over the 15-day recording period. Due to the exploratory nature of the present study, univariate statistics (e.g., trend analyses) were examined even if the MANOVA group-by-time effects were nonsignificant.

The results of the MANOVA for low, medium, and high NA revealed that there was a

significant main effect for group,  $F(8, 138) = 3.53, p < .001$ . This finding is to be expected as participants were categorized based on differences on this variable. There was no significant main effect for day,  $F(56, 16) = 1.34, p = .263$ , however, there was a significant main effect for time-of-day,  $F(4, 68) = 6.21, p < .001$ . The present study was interested in exploring daily effects of self-monitoring, and, as such, was concerned with day effects rather than time-of-day effects.

Although the MANOVA did not yield significant interactions between group and day,  $F(112, 34) = 1.27, p = .215$ , or group and time-of-day effects,  $F < 1$ , trend analyses revealed a significant group-by-day linear trend for daily anxious mood,  $F(2, 71) = 3.59, p = .033, \eta^2 = .09$ . As can be seen from Figure 8, the high NA group exhibited a linear decline in anxious mood over the 15 days, whereas the low and medium groups showed a small positive trend. The actual rate of decrease in anxious mood for the high NA group was  $-0.15$  units/day, resulting in a total reduction in anxious mood of 2.25 units over the 15 days. The slopes for the low and medium NA groups were .09 and .06, respectively, reflecting an increase in anxious mood of 1.41 units for the low NA group and 0.87 for the medium NA group.

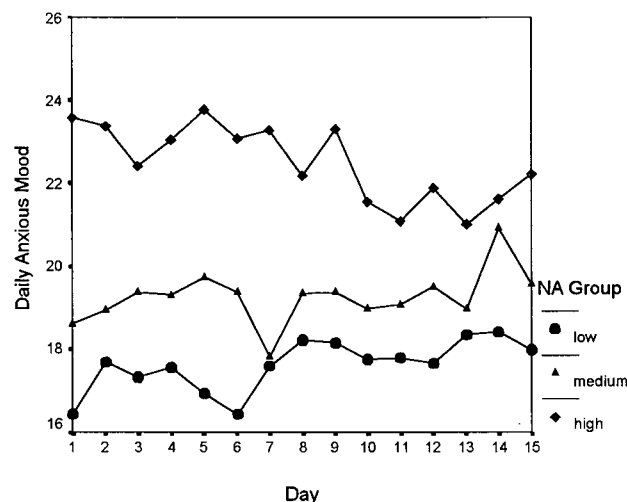
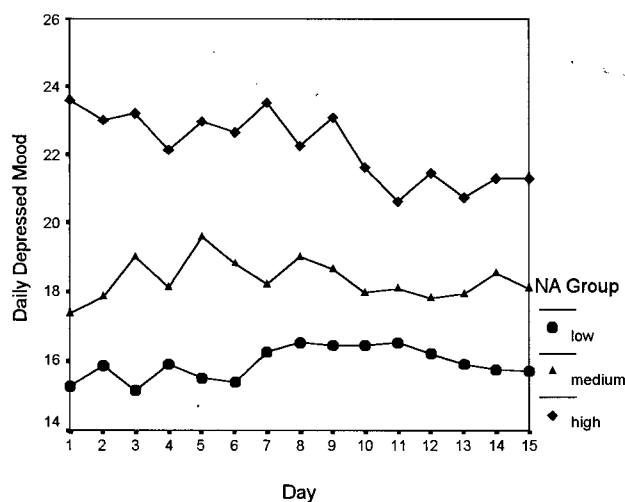


Figure 8. Daily anxious mood scores over the 15 workday self-monitoring period for participants with low, medium, and high levels of NA.

There was also a significant linear trend among the three groups with regards to daily depressed mood,  $F(2, 71) = 3.17, p = .048, \eta^2 = .08$ . As can be seen from Figure 9, the high NA group exhibited a linear decline in depressed mood over the 15 days. The medium NA group also declined slightly in depressed mood over the 15 days whereas the low NA group showed a slight positive trend in depressed mood over the 15 days. The actual rate of decrease in depressed mood for the high group was  $-.18$  units/day, resulting in a total reduction in depressed mood of  $2.73$  units over the 15 days. The slope for the medium NA group was  $-.01$ , reflecting a total decrease in depressed mood over the recording period of  $.20$  units. Finally, the slope for the low NA group was  $.05$  revealing an increase of  $.69$  units over the 15 days. NA was not associated with a linear trend for positive or negative mood.



*Figure 9.* Daily depressed mood scores for the 15 workday self-monitoring period for participants with low, medium, and high levels of NA.

Examining the association of high, medium, and low levels of depressive symptomatology with daily measures of positive, negative, anxious, and depressed mood yielded results similar to the analyses of NA. There were significant main effects for group,  $F(8, 138) = 5.96, p < .001$ , and time of day,  $F(4, 68) = 6.66, p < .001$ . There was no significant effect for day,  $F(56, 16) = 1.44, p$

= .214. The group-by-day effects,  $F < 1$ , or the group by time of day effects,  $F(8, 138) = 1.45$ ,  $p = .180$ , also were not significant. None of the trend analyses were significant. Thus, there was no evidence that different levels of depressive symptomatology were associated with differential changes in daily positive, negative, anxious, or depressed mood over the recording period.

In summary, results indicate that there was no relationship between participants' self-reports about how daily self-monitoring affected them and their levels of NA and depressive symptomatology at Time 1. Regarding the second part of Question 5, MANOVA results showed that participants with low, medium, or high levels of NA and depressive symptomatology did not respond significantly differently over the 15-days daily recording period in terms of daily positive, negative, anxious, and depressed mood. Though the MANOVA results failed to show that participants with different levels of NA changed differentially over the 15 workday recording period, trend analyses revealed that participants with higher levels of NA exhibited a linear decline in daily anxious mood over the 15-day recording period, whereas participants with moderate and lower levels of NA showed a small increase in anxious mood over the 15 days. As well, trend analyses revealed that participants with higher levels of NA exhibited a moderate linear decline in daily-depressed mood over the 15 days, as did the moderate NA group, albeit a much slighter decline. Participants with low levels of NA exhibited a slight increase in depressed mood over the 15 days.

*Ancillary data.* To provide a context for the findings from the main research questions, descriptive data are provided for additional items from the Effects of Participation Form, which asked participants about other aspects of self-monitoring. For example, 37% of participants reported that they did not change the way they answered the diaries over time. Forty-two percent reported that they became more sensitive to the questions over time, whereas 11% indicated that over time they responded to the questions in a rote fashion. A similar number of participants



(10%) said they became more sensitive to some questions, but less attuned to others on the diaries.

The majority of participants (72%,  $n = 53$ ) reported that they did not talk to other people about the diary questions, whereas 28% ( $n = 21$ ) discussed the study with another person. Of the 21 participants who reported speaking to someone about the study almost half indicated that they did not go into details about the project ( $n = 9$ ), about a third ( $n = 7$ ) mentioned the study to coworkers, and 4 said they talked to their partner about the study.

Finally, participants were asked to comment on any aspect of recording on a daily basis that they felt the researchers should know about. Thirty-five percent did not add any further comments. Twenty-six percent of the participants' comments made reference to how daily recording increased their awareness of either their external situation or internal processes. Twenty percent made recommendations for changes in the daily diary procedure (e.g., "Less daily diaries – i.e., take out lunch or dinner, more compact questions"). A small number of participants indicated that participating in the project was arduous or stressful (11%). Several pointed out that the diaries provided an outlet to "vent" (8%). Appendix F provides descriptive information on the categories for Items 2, 5, and 6 of the Effects of Participation Form.

## DISCUSSION

The present study explored participants' reactivity to the daily self-monitoring of stress and coping processes through an analysis of changes in state and trait measures of satisfaction and distress, as well as participants' self-reported reactions. In addition, individual differences in reactivity were examined, namely that differing levels of NA and depressive symptomatology were associated with differential responses to daily self-monitoring. There was no evidence of overall reactivity, on either daily state measures of mood or stable trait measures of satisfaction and distress. In contrast, participants' self-reports indicated that the process of daily self-monitoring had an impact (e.g., decreased stress, increased awareness). However, there was no evidence that self-reported responses to daily self-monitoring (e.g., positive overall experience vs. negative overall experience) were related to differential change over time in satisfaction and distress, with the exception of self-reported changes in behavior. Finally, there was little evidence that level of NA and depressive symptomatology were associated with either self-reported effects or changes in mood across days; the exception that higher NA was associated with a small linear decrease in daily anxious and depressed mood, which is contrasted with a slight increase in anxious and depressed mood for participants with lower NA.

### *Overall Evidence of Reactivity*

As other daily process researchers have noted, the examination of overall trends in daily data is a good start to the exploration of reactivity and the absence of linear trends would be inconsistent with a reactive effect of self-monitoring (Affleck et al., 1999). In the present study, there was no evidence of overall change in daily mood (i.e., positive, negative, anxious, or depressed mood) over the 15 days. Thus, daily self-monitoring of stress and coping does not appear to affect participants' daily mood. Put another way, having participants focus on distressing events and record their experience on a daily basis did not lead to a systematic increase

or decrease in their daily mood. This is consistent with the findings of behavioral researchers that self-monitoring more than one behavior leads to minimal or no reactive effects (Hayes & Cavior, 1977, 1980).

In addition to examining changes in daily mood, changes in the number of stressors reported over the 15-workday recording period was explored with participants grouped on the number of stressors reported during the first week (low, medium, high). Results revealed that participants who reported a high number of stressors in the first week decreased in the number of stressors reported during the second week; whereas those who reported a small number of stressors during the first week increased during the second week. However, other explanations for this finding cast doubt as to whether the differential change in the number of stressors reported over the 3-week period is evidence of reactivity. The decrease in the number of stressors reported by the high initial stressor group may reflect a ceiling effect. However, 60% of the participants in this group reported between 7 and 8 stressors (out of possible 10), suggesting that the decrease in the number of stressors from the first to the second week may be due to fatigue. It is likely that the increase in stressors reported during the second and third weeks by the initially low group was due to research assistants who were instructed to encourage participants who had not reported many stressors in the first week of diaries to report stressors that were daily hassles rather than more major events.

One of the strengths of the current study is the presence of a comparison group, participants who completed Time 1 and Time 2 questionnaire packages, but did not self-monitor daily. It should be noted that although participants were not given the option of choosing to participate in the diary or non-diary portion of the study neither were participants randomly assigned to the diary or non-diary group, therefore there is still the possibility of systematic group differences. There was no evidence daily diary participants' levels of anxiety, depressive

symptomatology, job and life satisfaction changed differentially over a 1-month period, compared with participants who did not record daily. Thus, it appears that daily self-monitoring did not have an effect on participants' levels of distress (anxiety, depressive symptomatology) or job and life satisfaction. Thus, an exploration of both daily measures of mood and more stable measures of satisfaction and distress failed to find evidence of reactivity.

### *Participants' Perceptions of Impact*

One of the more interesting findings from the present study is the contrast between the lack of evidence of overall reactivity and participant feedback regarding the impact of daily self-monitoring. Content analyses of the self-reports suggested that most participants (93%) felt that filling out the diaries twice a day had an impact on them. Rather than being a benign procedure, daily self-monitoring, according to participants, had an impact. Similar to Verbrugge's (1989) findings, half of the participants (50%) felt that completing the daily diaries increased their awareness of their situation, their behavior, or both. Participants in the present study indicated that this increased awareness provided them with the chance to reflect and gain insight (e.g., "It [impact of daily self-monitoring] was to make stressful experiences more identifiable and to see if a pattern was established re: cause and effect"). The opportunity research affords participants to consider their experiences in a different way and highlighting certain facets of their experience has been noted by other researchers interested in participants' reactions to research participation (e.g., Brennen, 1993; Hughes & Surra, 2000). A number of participants (61%) also indicated that daily self-monitoring affected their mood, with slightly over half (51%) reporting feeling calmer, less stressed (e.g., "I think I felt calmer, less stressed out, perhaps a sense of relief/release"). About a third (35%) indicated that self-monitoring affected their behavior; the majority of these participants felt that self-monitoring had a positive effect (85%) (e.g., "...because of better awareness of what pushes my buttons, better able to respond to verbally abusive clients"). Taken

together, these results suggest that participants felt that daily self-monitoring had an effect on either their behavior, their mood, or both.

There was some consistency among responses regarding overall experience, changes in behavior, and changes in mood, though it should be noted that not all response categories could be analyzed due to small cell sizes. As expected participants who felt that, overall, participation was a positive experience reported a positive impact on mood and participants who felt daily self-monitoring was a negative experience reported a negative impact on mood. This association might suggest that the increased awareness reported by the majority of participants in the positive overall experience category was related to improvements in mood. There was a weaker association between positive changes in mood and positive changes in behavior and no significant association between overall experience (both positive and negative) and no change or positive changes in behavior.

In terms of the data derived from participants being asked directly about their experience of daily monitoring two observations bear mention. First, it was noted that in responding to the question regarding changes in behavior due to self-monitoring, a number of participants indicated a change, but the change was not a behavioral one (e.g., "I felt better at work. I didn't feel so alone"). A second observation about responses to the Effects of Participation Form concerns the last question, which asked participants if there was anything further they thought the researchers should know about daily recording. A quarter of participants (26%) again reiterated that daily self-monitoring increased their awareness of either their situation or their inner experience, or both (e.g., "It was actually a valuable process...I started to notice patterns, and coping strategies that alleviated stress versus those that didn't really help much").

The lack of convergence between participants' responses to being asked directly about the experience of daily self-monitoring and indirect measures of reactivity raises the issue of the

accuracy of self-reports regarding mental processes or the relationship among complex stimuli and responses. In considering participants' perceptions regarding daily self-monitoring, a key concern involves an individual's ability to access and report on internal processes. In a classic article on this issue, Nisbett and Wilson (1977) argued that "people often cannot report accurately on the effects of a particular stimuli on higher order, inference-based responses" (p. 233). In the current context, the issue is the validity of participants' perceptions about the daily self-monitoring experience: Are participants able to correctly identify the effects of daily self-monitoring on their mood and behavior? It is possible the participants responded to the self-reported effects of participation measure based on *a priori* assumptions regarding the effects of daily recording on mood and behavior. For example, the idea that keeping a diary is beneficial may be common in our culture (e.g., National Women's Health Resource Center, 2002) and participants may have accessed this assumption when asked about daily recording.

Another possible reason for the discrepancy between direct and indirect measures of self-monitoring may involve the time frame used in the present study. As traditionally measured in behavioral research, reactivity was assessed shortly after self-monitoring (e.g., a few minutes to a few days). The impact of participating in a daily diary study of stress and coping may be delayed and its effects may not be felt until some time after self-monitoring has ceased. For example, one participant in the study reported, "I became aware that my boss harasses me. I took it to labor relations." According to this participant, self-monitoring provided her with a awareness about inappropriate conduct by her boss, which lead to a decision to take action. The process of taking a grievance to labor relations may be very difficult and prolonged and the outcome may prove beneficial or disappointing. The point being that the impact of daily self-monitoring may not be reflected in the variables used in the present study as it may not have occurred during the duration of the study. The possibility raises questions regarding how daily process researchers define

reactivity (e.g., short-term vs. longer-term or delayed effects), and thus how it should be assessed.

### *Individual Differences in Reactivity*

In their overview of daily process research, Affleck et al. (1999) suggested going beyond the examination of overall trends to assess reactivity and to include an exploration of possible individual differences in reactivity. As well as looking for evidence of reactivity in the whole group of daily diary participants (e.g., trends in daily data, comparisons between diary and non-diary participants), in the present study, I explored possible differential responses to daily self-monitoring based on both participants' self-reported experiences (e.g., changes in mood) and specific participant characteristics that might influence the impact of daily recording (e.g., NA).

There was no evidence that participants' self-reports of their overall experience (positive or negative), or their perceived change in mood (no change, positive change, or negative change) were related to changes in life and job satisfaction, anxiety, or depressive symptomatology assessed before and after the self-monitoring period. Results did show that anxiety and depressive symptomatology scores for participants who reported a positive change in behavior decreased from Time 1 to Time 2 and; conversely, anxiety and depressive symptomatology scores for participants who reported no change in behavior increased from Time 1 to Time 2. The decrease in distress (anxiety and depressive symptomatology) among participants who reported a positive behavior change could be interpreted as positively perceived behavior change leading to an increase in feelings of efficacy and control and/or reflecting a change in their work context brought about through a change in behavior (e.g., "Felt may have been more assertive because some questions asked what you did about it, realized wasn't doing much about it, so more assertive as a result, asked for a computer course"). Conversely, the increase in anxiety and depressive symptomatology among participants who reported no change in behavior may reflect the cumulative effects of being in a stressful situation where change does not seem possible (e.g.,

“It did not have an impact on my daily work. There are too many variables in my job to be able to control the environment”). However, this finding should be interpreted with caution given the problematic nature of self-report data (e.g., recall biases, inability to accurately assess internal processes), the lack of other evidence supporting reactivity, and the possibility of Type 1 error given the number of statistical tests used in the present study.

In the present study, there was no evidence that quality (e.g., positive, negative) of participants' self-reported experience (overall experience, changes in behavior, changes in mood) was associated with their levels of NA or depressive symptomatology. For example, there was no evidence that participants who felt daily self-monitoring was a negative experience were more likely to be higher in NA than participants who reported that self-monitoring was a positive experience. Again, the possible inability of individuals to accurately report on their own experience, either due to recall biases, limited access to internal processes, or both, may account for the lack of association between direct self-reports on the effects of daily self-monitoring and indirect measures of neuroticism (e.g., NA) or distress (e.g., depressive symptomatology). The lack of association between direct self-reports by participants regarding the impact of daily self-monitoring and indirect measures of reactivity (e.g., daily mood), as well as individual differences variables is consistent throughout the study.

There was no evidence that participants' levels of depressive symptomatology were related to differential changes in mood over the 15-workday diary period. Though multivariate analyses failed to show any evidence that participants with different levels (low, medium, high) of NA and depressive symptomatology changed differentially over the 15-workday self-monitoring period in terms of daily positive, negative, anxious, or depressed mood; trend analyses revealed that individuals with high NA showed linear declines in both anxious and depressed mood, whereas participants with low levels of NA showed a linear increase in both anxious and



depressed mood. Individuals with moderate levels of NA showed an increase in anxious mood, but a decrease in depressed mood over the 15 days.

This finding is somewhat surprising because research on NA would suggest that individuals high in NA focus on negative events (e.g., stressors), which would likely increase their negative mood (e.g., Larsen & Ketelaar, 1991). Anecdotal evidence from participants in the present study hints at a possible account for this finding. Namely that some questions on the diary form may draw participants' attention to features of their experience they might not normally notice or consider. As an example, one participant mentioned that filling out a measure of quality of coworker interactions helped her realize how her coworkers could be supportive, as opposed to only focusing on negative interactions. As well, some participants mentioned that the coping measure provided them with ideas about alternative ways they could deal with stressful situations. Conversely, some participants reported that the diaries forced them to acknowledge unpleasant or difficult aspects of their situations. It is possible that the content of this focusing and thus the consequences may differ as a function of whether an individual is high or low in trait NA.

Reports of increased awareness were a prominent feature in participants' reflections on the experience of participating in a diary study of daily stress and coping. This finding is consistent with theoretical explanations of reactivity, which all posit that reactive effects are due to increased awareness brought on by self-monitoring (e.g., Nelson & Hayes, 1981). Unfortunately, the present study did not include measures of trait self-focused attention also referred to as self-consciousness, or state self-focused attention (i.e., self-awareness). Therefore, data were limited to participants' self-reports regarding the impact of daily self-monitoring on awareness. The potentially problematic nature of self-reflections is again highlighted when considering research that has explored self-focused attention and self-awareness on a daily basis. Nezlek (2002), in a daily diary study of self-awareness, daily events, and anxiety, reported that daily levels of private

self-consciousness and public self-consciousness did not change (e.g., increase) over the daily self-monitoring period. This finding is somewhat similar to results found by Wood et al. (1990) that daily self-focused attention did not systematically change over 84 days of daily self-monitoring, but that self-focused attention acted as a between-subjects variable. Both studies failed to find overall increases or decreases in daily self-awareness, which suggests that the daily diaries did not act as a self-focus “manipulation.” Though the present study did not include measures of self-focused attention, participants’ direct reports suggest that a large number of participants perceived their self-awareness as being heightened by daily self-monitoring.

Daily diary studies by Nezlek (2002) and Wood et al. (1990) did not find that daily self-monitoring led the majority of participants to increase their self-awareness over the recording period, nor was daily self-monitoring associated with a systematic decline in participants’ levels of self-awareness. However, participants’ reflections from the present study highlight not only an increase in awareness, but different foci of awareness (e.g., attentiveness to other possible coping strategies), and suggests that individual differences in not only the propensity for self-focused attention, but also in the content of this awareness may be an important variable influencing participants’ responses to daily self-monitoring. This propensity for self-awareness and the differing content of this self-focused attention may operate independently of other individual differences variables, which would account for the present study failing to find an association between self-reported impact of participation (e.g., overall experience) and NA and depressive symptomatology.

### *Limitations and Future Directions*

There are a number of limitations to the present study that bear mention. A number concern the nature of the sample. First, participants in the sample are all female. There may be gender differences in term of how men and women respond to daily self-monitoring. For example,

Ingram et al. (1988) found that women in their study were more sensitive to self-focusing stimuli (e.g., mirror) than men. Second, women in the study all classified themselves as clerical workers, which may limit generalizability to people working in other professions. Another concern may be the ability to apply the findings to other types of daily process methods (e.g., EMA) where the frequency and method of recording are different.

An additional limitation is the exploratory nature of the study. Moreover, multiple statistical tests were used to examine the issue of reactivity raising the probability of Type 1 error. As well, few of the results were statistically significant. Therefore the findings require further replication. As with much research in the social sciences, the present study relied on self-report. Thus, there is always the potential for inaccurate reporting, and though the time between the occurrence of a stressor event and the relating of the experience was reduced to 4 hours, the problem of recall biases still exists. Recall biases may also have influenced responses to the Effects of Participation Form, which asked participants to recall, at the end of 15 days, the experience of self-monitoring on a daily basis. Finally, the present study utilized an analytic strategy (repeated measures MANOVA) based on group means. Other multi-level analytic strategies such as Hierarchical Linear Modeling (HLM; Bryk & Raudenbush, 1992) may provide additional information about how people change over time.

Perhaps reactivity to daily process research is more complex than reactivity as conceptualized by behavioral researchers. It does not seem improbable that as the complexity of the self-monitoring task increases so too does the subtlety of the potential impact. The present study used changes in daily mood (positive, negative, anxious, and depressed), as well as changes in more stable measures of life and job satisfaction, trait anxiety, and depressive symptomatology, as indicators of reactivity. However, of equal concern to stress researchers may be changes in appraisal and coping processes over time due to intensive self-monitoring. Thus, future research

on the issue of reactivity to daily process methodologies should consider examining not only other variables (e.g., coping behaviors) for systematic changes, but also consider the relationship among variables (e.g., appraisals and coping) for possible evidence of reactivity. Researchers may also want to explore other individual difference variables (e.g., level of self-consciousness), which may account for differential patterns of responding to daily self-monitoring. Finally, the possibility that the impact of daily self-monitoring might occur in a longer time frame should also be considered.

The issue of reactivity is an important one for researchers using, or considering using, daily or more frequent self-monitoring procedures. With the exception of an association between level of NA (low, medium, or high) and differential trends in daily anxious and depressed mood, the present study found little evidence of systematic changes in data over time (daily mood and satisfaction and distress measured 1-month apart). Unlike research from other fields (e.g., Hayes & Cavior, 1977, 1980) that has been cited by daily process researchers to allay concerns regarding reactivity, the present study used data gathered from a daily process study of stress and coping to explore the issue of reactivity to daily process methods. Thus, the limited evidence of reactivity found in the present study is particularly relevant and encouraging for daily process researchers. However, further consideration of what reactivity means in the context of daily process research on stress and coping seems warranted. The lack of association between participants' self-reported experience of daily self-monitoring and other measures of change over time suggests that although data provided by participants may not reflect systematic change over time (reactivity), participants perceive that self-monitoring had had an impact.

Concerns regarding participants' perception of their research experience are equally important as concerns regarding reactive effects on the data. Researchers have an ethical obligation to "do no harm" and to inform participants about potential reactions to participation (American Psychological Association, 1992). Thus, the solicitation of participants' perceptions of

their research experience is important. For a researcher using daily process methods to study stress and coping, the present study provides evidence that daily self-monitoring does not lead to short-term systematic changes in mood. The present study also provides researchers with information on participants' perceptions of the impact of daily self-monitoring, of particular interest is the finding that the majority of participants felt that overall, self-monitoring was a positive experience. This finding is reassuring for researchers concerned about the impact of more intensive research procedures on participants. The issues of reactive effects and data quality and the impact of participation on participants are important. Although the present study has explored both these issues, further research is needed.

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# Appendix A: Overview of Study Characteristics of 36 Daily Diary Studies of Stress and Coping

Author	Participants	Occasions	Variables
Grzywacz, Almeida, & McDonald (2002)	N = 741 56% female	8 consecutive evenings Telephone diaries	Individual Differences Measures: Work-family spillover Telephone Diaries: 1. Daily Inventory of Stressful Events
Mohr, Armeli, Tennen, Carney, Affleck, & Hromi (2001)	N = 100 55 women 98% Caucasian	Written diary once a day, for 30 days Palmtop computer event contingent (recorded each drink)	Individual Differences Measure: Neuroticism Palm Computer: 1. Type of alcohol 2. Number of ounces 3. Proof 4. Location 5. Social context Written Diary: 1. Negative interpersonal exchanges 2. Positive interpersonal exchanges
Hahn (2000)	N = 86 46 women Working Students	Written diary once a day, after work, for 14 consecutive days	Individual Differences Measures: 1. Interpersonal locus of control Diary: 1. Physical health 2. Mood 3. Interpersonal Conflict 4. Coping
Bolger, Zuckerman, & Kessler (2000)	N = 68 couples Law students	Once a day, 32 days before bar exam to 3 days after	Daily Diary: 1. Examinee anxiety & depression 2. Partner's provision of emotional support
Armeli, Carney, Tennen, Affleck, & O'Neil (2000)	N = 88 48 women 53% married 100% Caucasian	Once a day for 60 days	Daily Diary: 1. Assessment of daily stress 2. Desire to drink 3. Alcohol consumption

Author	Participants	Occasions	Variables
Gable & Reis (2000)	N = 50 34 women	Once a day for 14 consecutive days	Individual Differences Measures: 1. Behavioral Activation System/Behavioral Inhibition Daily Diary: 1. Daily events 2. Positive/Negative Affect
David & Suls (1999)	N = 95 All men 95% Caucasian	Once a day for 8 consecutive days	Individual Differences Measure: Big-Five Traits Personality Inventory Daily Diary: 1. Daily event checklist 2. Daily mood 3. Physical symptoms 4. Daily coping (Stone & Neale, 1984) 3. Undesirability ratings 4. Perceived control ratings
Preece, DeLongis, O'Brien, & Campbell (1999)	N = 162 Couples	Once a day for 7 consecutive days	Daily Diary: 1. Daily stress 2. Appraisals 3. Coping
Smith, Leffingwell, & Ptacek (1999)	N = 132 for daily measures Males/females	Once a day, 7 consecutive days prior to exam and 7 days after exam	Daily Diary: 1. Coping 2. Stress and performance appraisal a. Exam related stress – 1 item b. Performance appraisal – estimated score on exam
Gunthert, Cohen, & Armeli (1999)	N = 197 College students; 134 women; 87% Caucasian	Once a day for 14 consecutive days	Individual Difference Measure: Neuroticism Daily Diary: 1. Stress, appraisal and coping 2. Daily mood
Almeida & Kessler (1998)	N = 332 Married couples Caucasian	Once a day for 42 consecutive days	Daily Diary: 1. Daily Distress 2. SCL Distress 3. Daily Stresses



Author	Participants	Occasions	Variables
Stephens, Kimbell, & Basford (1998)	<i>N</i> = 73 35 women	Once a day for 12 consecutive days	Individual Differences Measure: Trait Anxiety and Motives for Exercise Daily Diary: 1. Exercise (type and duration) 2. Mood 3. Daily Stress Inventory
Rafferty, Smith & Ptacek (1997)	<i>N</i> = 158 68% women 70% Caucasian	Once a day for 7 days	Individual Difference Measure: Trait Anxiety Daily Diary: 1. DCI 2. Definitional Anxiety Inventory
David, Green, Martin, & Suls (1997)	<i>N</i> = 96 All male 95% Caucasian	Once a day for 8 consecutive days	Individual Difference Measures: Neuroticism and Extraversion Daily Diary: 1. Daily Life Experience Inventory 2. Positive and negative affect
Fabes & Eisenberg (1997)	<i>N</i> = 92 College students; 47 women; 79% Caucasian	Once a day for 14 consecutive days	Individual Differences Measures: Self-report measures of regulatory control Physiological Measures: 1. Vagal tone – based on heart rate Daily Diary: 1. Daily stress
Repetti & Wood (1997)	<i>N</i> = 30 Mother/ child dyads Primary clerical	Twice a day for 5 consecutive days	Daily Diary: 1. Daily job stressors 2. Mothers' daily reports of parent-child interactions  Two Weeks After Daily Diary: 1. Mothers' Psychological Distress

Author	Participants	Occasions	Variables
Sheldon & Ryan (1996)	N = 60 University students	Once a day for 14 consecutive days	Individual Differences Measures: 1. Autonomy 2. Competence Daily Diary: 1. Well-being outcome measures 2. Daily Activities Measure
Stewart & Barling (1996)	N = 71 58 women Drs, nurses, & techs @ cancer clinic	Once a day for 20 days	Individual Differences Measures: 1. Work autonomy 2. Role ambiguity 3. Role conflict 4. Role overload 5. Job satisfaction 6. Informal social support 7. Emotional social support 1. Depression (CFS) 2. Life experiences Daily Diary: 1. Objective work stressor 2. Subjective work 3. Mood 4. Interpersonal job performance
Jones & Fletcher (1996)	N = 40 Couples	Once a day for 21 days -not required to complete forms if: a) one of couple did not work that day or b) spent less than 1 hr together during evening	Individual Differences Measures: 1. Anxiety-Depression 2. Carryover from work to home Daily Diary: 1. Sleep 2. Work stressors 3. Domestic stressors 4. Cognitive symptoms 5. Mood 6. Communication

Author	Participants	Occasions	Variables
Bolger & Zuckerman (1995)	<i>N</i> = 94 65 women University students	Once a day for 14 consecutive days	Individual Differences Measure: Neuroticism Daily Diary: 1. Interpersonal conflicts 2. Coping 3. Distress
Adams, Dammers, Sais, Brontley, & Gaydes (1994)	<i>N</i> = 41 39 women	Once a day for 56 consecutive days	Daily Diary: 1. Life Experiences Survey (LES) 2. Daily Stress Inventory 3. Symptom History and Daily Symptoms Checklist
Ptacek, Smith, Espe, & Rafferty (1994)	<i>N</i> = 110 71 women	Once a day for 7 days	Daily Diary: 1. Coping 2. Appraisal
Katz & Campbell (1994)	<i>N</i> = 66 University students 41 women	Twice a day for 14 consecutive days	Individual Differences Measures: 1. Ambivalence over Emotional Expression (AEQ) 2. Emotional Expression Questionnaire 3. Neuroticism 4. Depression 5. Physical Health Daily Diary: 1. Mood 2. Daily event stress 3. Emotional responses 4. Health

Author	Participants	Occasions	Variables
Langston (1994) Study 1	N = 54 Female sorority members	Once a day for 15 consecutive days	Individual Differences Measures: Large questionnaire, comprehensive assessment of life tasks, dispositions, strategies, self-esteem and perceived stress Daily Diary: 1. Daily events 2. Response to event 3. Feelings about event Random Experience Sampling 5 random alarms per day 1. Experience sampling record sheet – reported activities and rated their feelings on 13 bipolar, 7 pt scales (adapted from Csikszentmihelyi & Larson, 1984; Norem, 1987) Outcome Questionnaire 1. Perceived stress – PSS 2. Domain specific life satisfaction scale Daily Diary: 1. Positive/Negative Affect 2. Positive/Negative Daily Diary: 1. Negative social interaction at 2. Daily workload 3. Physical well-being 4. Mental well-being
Study 2	N = 49 36 women	Once a day for 14 consecutive days	
Repetti (1993)	N = 52 Air traffic controllers	Once a day for 3 consecutive days	Daily Diary: 1. Negative social interaction at 2. Daily workload 3. Physical well-being 4. Mental well-being
Barling & Macintyre (1993)	N = 53 48 men Instructors from military school	Once a day for 20 consecutive work days	Individual Differences Measures: 1. Role ambiguity & conflict scales 2. Role overload scale 3. Emotional exhaustion 4. Depression Daily Diary: 1. role conflict 2. role ambiguity 3. role overload 4. emotional exhaustion 5. mood

Author	Participants	Occasions	Variables
Kelloway, Barling, & Shah (1993)	<i>N</i> = 20 95% female Managerial occupations	Once a day for 20 consecutive days ( <i>M</i> number of days = 11.4)	Daily Diary: 1. Industrial relations stress 2. Mood 3. Job satisfaction  Individual Differences Measure: Neuroticism Daily Diary: 1. Daily Stressors 2. Daily Distress
Bolger & Schilling (1991)	<i>N</i> = 339 166 couples + 2 individuals	Once a day for 42 consecutive days	Individual Differences Measures: 1. Neuroticism 2. Prior academic performance – GPA 3. Coping 4. MCAT score Daily Diary: 1. Anxiety
Bolger (1990)	<i>N</i> = 50 Students writing MCAT 26 women	Once a day for 35 consecutive days	Individual Differences Measure: Dysphoria Daily Diary: 1. Mood 2. Self-focused attention 3. Coping responses  Daily Diary: 1. Daily Stresses 2. Daily Mood
Wood, Saltzberg, Neale, Stone, & Rachmiel (1990)	<i>N</i> = 40 Male sample	Once a day for 84 – 112 days ( <i>M</i> = 110)	Individual Differences Measures: Daily Diary: 1. Mood 2. Self-focused attention 3. Coping responses  Daily Diary: 1. Daily Stresses 2. Daily Mood
Bolger, DeLongis, Kessler, & Schilling (1989)	<i>N</i> = 332 Married couples Caucasian	Once a day for 42 consecutive days	Individual Differences Measures: Daily Diary: 1. Chronic ecological stress 2. Major life events 3. Social support Daily Diary: 1. Stressful daily events 2. Overall daily mood
Caspi, Bolger, & Eckenrode (1987)	<i>N</i> = 96 Women 50% married 20% Spanish speaking	Once a day for 28 consecutive days	

Author	Participants	Occasions	Variables
Stone (1987)	<i>N</i> = 79 Married men	Once a day for 84-112 consecutive days ( <i>M</i> = 110)	Daily Diary: 1. Mood 2. Daily Life Experience Inventory
Eckenrode (1984)	<i>N</i> = 96 All female	28 consecutive days	Individual Differences Measures: 1. Acute stressors 2. Chronic stressors 3. Psychological well-being Daily Diary: 1. Daily stressful events 2. Symptoms experienced 3. Overall mood

Appendix B: Demographic Comparisons of Diary and Non-Diary Participants, and Diary  
Participants and Dropouts

*Demographic Comparisons of Diary versus Non-diary Participants*

	Non-Diary <i>n</i> = 101		Daily Diary <i>n</i> = 74		Difference Between Groups	
Continuous Variables						
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
Number of Years in Workforce	23.04	9.56	20.07	8.31	<i>F</i> (1, 173) = 4.60	<i>p</i> = .033
Average number of hours worked in 7 days	36.02	3.81	38.46	7.50	<i>F</i> (1,171) = 7.81	<i>p</i> = .006
Age	43.93	9.31	40.08	9.30	<i>F</i> (1,173) = 7.31	<i>p</i> = .008
Categorical Variables						
	<i>f</i>	%	<i>f</i>	%	$\chi^2$	<i>p</i>
Household income (before taxes)						<i>ns</i>
Under \$25,000	5	5	5	7		
\$26,000-60,000	63	62	39	53		
\$61,000-100,000	28	28	25	64		
Over 100,000	5	5	5	7		
Union Member					$\chi^2$ (1, <i>N</i> = 175) = 6.57	<i>p</i> = .01
Yes	90	89	55	74		
No	11	11	19	26		
Marital Status						<i>ns</i>
Married	58	57	47	64		
Single	43	43	27	36		
Parental Status					$\chi^2$ (1, <i>N</i> = 175) = 7.21	<i>p</i> = .007
Parent	63	62	31	42		
No children	38	38	43	58		
Highest Educational Level						<i>ns</i>
High School	25	23	15	20		
Technical Training	23	23	14	19		
College/University	53	52	45	61		
Canada country of birth						<i>ns</i>
Yes	82	81	62	84		
No	19	19	12	16		

*Demographic Comparisons of Diary Participants versus Participants who Dropped Out*

	Participants who Dropped out <i>n</i> = 23		Daily Diary <i>n</i> = 97		Difference Between Groups	
Continuous Variables						
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
Number of Years in Workforce	15.30	8.66	19.29	8.12	<i>F</i> (1,118) = 4.36	<i>p</i> = .04
Average number of hours worked in 7 days	36.33	5.12	38.19	6.79		<i>ns</i>
Age	38.04	9.03	39.18	9.34		<i>ns</i>
Categorical Variables						
	<i>f</i>	%	<i>f</i>	%	$\chi^2$	<i>p</i>
Household income (before taxes)						<i>ns</i>
Under \$25,000	5	22	6	6		
\$26,000-60,000	12	52	57	59		
\$61,000-100,000	5	22	29	30		
Over 100,000	1	4	5	5		
Union Member						<i>ns</i>
Yes	17	74	72	74		
No	6	26	25	26		
Marital Status						<i>ns</i>
Married	8	35	61	63	$\chi^2$ (1, N = 120) = 6.01	<i>p</i> = .014
Single	15	65	36	37		
Parental Status						<i>ns</i>
Parent	13	57	40	41		
No children	10	43	57	59		
Highest Educational Level						<i>ns</i>
High School	5	22	18	19		
Technical Training	4	17	15	15		
College/University	14	61	64	66		
Canada country of birth						<i>ns</i>
Yes	18	78	83	86		
No	5	22	14	14		



# Appendix C: Intercorrelations Among Daily Diary Variables

*Intercorrelations Among Noon and End-of-Workday Variables Over 5 Consecutive Days (N = 74)*

Noon	End-of-Workday																			
	Day 6				Day 7				Day 8				Day 9				Day 10			
	PM	NM	AM	DM	PM	NM	AM	DM	PM	NM	AM	DM	PM	NM	AM	DM	PM	NM	AM	DM
Day 6																				
PM	.73	-.06	-.12	-.21	.72	-.15	-.23	-.31	.58	-.20	-.20	-.27	.51	-.12	-.15	-.14	.57	-.08	-.09	-.19
NM	-.14	.43	.48	.36	-.18	.60	.50	.36	-.20	.40	.35	.34	-.13	.48	.23	.25	-.09	.29	.19	.12
AM	-.27	.39	.61	.46	-.24	.49	.60	.43	-.20	.41	.54	.42	-.18	.37	.33	.31	-.19	.24	.36	.25
DM	-.44	.40	.61	.69	-.43	.48	.52	.56	-.31	.40	.46	.57	-.38	.43	.34	.47	-.26	.21	.26	.27
Day 7																				
PM	.69	-.14	-.23	-.29	.82	-.16	-.33	-.41	.52	.01	-.09	-.23	.65	-.07	-.27	-.26	.72	-.16	-.22	-.41
NM	-.11	.32	.47	.45	-.18	.60	.56	.53	-.08	.48	.37	.45	-.13	.40	.24	-.33	-.20	.16	.13	.15
AM	-.31	.29	.57	.45	-.30	.54	.66	.62	-.16	.53	.63	.55	-.24	.24	.41	.46	-.27	.11	.35	.28
DM	-.51	.25	.56	.57	-.57	.46	.66	.75	-.24	.32	.42	.55	-.46	.26	.44	.56	-.42	.19	.40	.47
Day 8																				
PM	.54	-.16	-.29	-.33	.68	-.25	-.36	-.46	.65	-.03	-.24	-.41	.64	-.21	-.45	-.50	.60	-.18	-.34	-.53
NM	-.03	.49	.46	.31	-.01	.55	.34	.26	.07	.48	.45	.44	-.17	.49	.41	.36	-.01	.15	.12	.12
AM	-.25	.40	.57	.39	-.26	.43	.45	.36	-.14	.47	.61	.52	-.38	.59	.56	.51	-.19	.04	.28	.26
DM	-.31	.46	.60	.64	-.34	.44	.44	.54	-.29	.32	.57	.69	-.51	.47	.50	.71	-.29	.07	.28	.42
Day 9																				
PM	.65	-.08	-.24	-.35	.56	-.22	-.40	-.48	.61	-.10	-.36	-.44	.71	-.14	-.36	-.45	.58	-.21	-.36	-.52
NM	-.12	.46	.50	.40	-.14	.47	.50	.45	-.02	.48	.46	.46	-.13	.62	.56	.58	-.04	.19	.23	.23
AM	-.16	.42	.58	.40	-.19	.41	.61	.54	-.08	.43	.61	.51	-.18	.56	.66	.67	-.08	.28	.45	.45
DM	-.30	.37	.53	.56	-.27	.40	.54	.66	-.25	.31	.57	.67	-.39	.43	.65	.85	-.19	.27	.46	.55
Day 10																				
PM	.60	-.15	-.23	-.31	.73	-.17	-.33	-.40	.67	-.07	-.18	-.33	.68	-.07	-.26	-.26	.81	-.22	-.27	-.50
NM	-.30	.17	.26	.24	-.42	.16	.35	.32	-.37	.13	.34	.35	-.39	.20	.37	.35	-.31	.45	.48	.47
AM	-.34	.19	.40	.39	-.44	.20	.49	.49	-.40	.18	.52	.49	-.44	.20	.51	.53	-.38	.48	.69	.65
DM	-.48	.29	.44	.51	-.58	.16	.42	-.40	.54	.14	.42	.52	-.58	.26	.57	.65	-.57	.50	.78	.78

Note. PM = Positive Mood. NM = Negative Mood. AM = Anxious Mood. DM = Depressed Mood.

$r > .23 = p < .05$ .  $r > .28 = p < .01$ .

*Intercorrelations Among Noon Variables Over 5 Consecutive Days (N = 74)*

Noon	Noon														
	Day 6					Day 7					Day 8				
	PM	NM	AM	DM	DM	PM	NM	AM	DM	DM	PM	NM	AM	DM	DM
Day 6															
PM															
NM															
AM															
DM															
Day 7															
PM															
NM															
AM															
DM															
Day 8															
PM															
NM															
AM															
DM															
Day 9															
PM															
NM															
AM															
DM															
Day 10															
PM															
NM															
AM															
DM															

*Note.* PM = Positive Mood. NM = Negative Mood. AM = Anxious Mood. DM = Depressed Mood.

$r > .23 = p < .05$ .  $r > .28 = p < .01$

*Intercorrelations Among End-of-Workday Variables Over 5 Consecutive Days (N = 74)*

End of Workday		End-of-Workday																					
		Day 6				Day 7				Day 8				Day 9				Day 10					
		PM	NM	AM	DM	PM	NM	AM	DM	PM	NM	AM	DM	PM	NM	AM	DM	PM	NM	AM	DM		
Day 6																							
PM		-.04	-.20	-.45	.75	.75	-.18	.44	.32	.32	.35	-.07	.33	.34	.37	-.15	.45	.44	.36	-.16	.18	.14	.19
NM																							
AM																							
DM																							
Day 7																							
PM																							
NM																							
AM																							
DM																							
Day 8																							
PM																							
NM																							
AM																							
DM																							
Day 9																							
PM																							
NM																							
AM																							
DM																							
Day 10																							
PM																							
NM																							
AM																							
DM																							
Day 10																							
PM																							
NM																							
AM																							
DM																							

*Note.* PM = Positive Affect. NM = Negative Affect. AM = Anxious Mood. DM = Depressed Mood.

$r > .23 = p < .05$ .  $r > .28 = p < .01$ .

## Appendix D: Categories of Responses for Items 1, 3, and 4 of the Effects of Participation

## Form

*Categorization of Responses, with Examples of Participants' Responses, to Item 1: How Daily Self-monitoring Affected Them in General*

Code	Percentage of Participants <sup>a</sup>	<i>f</i>
Gained perception/insight; allowed reflection <sup>b</sup>	50	37
Helped me reflect/think about the events of the day in a more orderly fashion.		
Makes me more reflective and makes me stop and think.		
It was to make stressful experiences more identifiable and to see if a pattern was established re: cause and effect.		
Increased awareness of negative <sup>c</sup>	7	5
Made me realize how unhappy I was.		
I have obviously focused on that stresses me and facing and/or recognizing the stressor makes me even more hostile that I am subjected to them.		
Provided extra work, hassle <sup>c</sup>	11	8
More stress to fit it into the daily routine.		
It created more stress by having to fill it out at set times each day, twice a day, during work time.		
No effect <sup>d</sup>	7	5
Allowed expression, venting <sup>b</sup>	10	7
Provided way to vent stress.		
It was good to write down stressors, helped to get it on paper, sometimes didn't seem to be as big of a deal as it was originally thought.		

Code	Percentage of Participants <sup>a</sup>	<i>f</i>
Unspecified effect <sup>e</sup>	8	6
Makes me more aware of daily stresses. I became more aware of what problems at work cause me stress.		
Nonspecific negative effect <sup>c</sup>	4	3
I found the process of recording very stressful itself. I found that as I was recording my stresses on the diaries I felt more stressed out.		
Interfered with routine; interfered with usual practices <sup>c</sup>	4	3
At lunch time I wanted to get away from the stress, not have to stop to answer questions. They took some time away from other things I wanted to do.		

<sup>a</sup> Does not add up to 100 due to rounding error. <sup>b</sup> Overall positive experience. <sup>c</sup> Overall negative experience. <sup>d</sup> Neutral experience. <sup>e</sup> Unspecified experience.

*Categorization of Responses, with Examples of Participants' Responses, to Item 3:How  
Daily Self-monitoring Affected Their Behavior*

Code	Percentage of Participants <sup>a</sup>	<i>f</i>
Did not effect behavior <sup>b</sup>	65	48
Effected behavior in positive, unspecified way <sup>c</sup>	16	12
Some change in behavior – better prepared to deal with coworker's irritating behaviors as a result of diary work. Yes, by just taking a deep breath and trying to be happier.		
Helped participants become more aware of their behavior <sup>c</sup>	11	8
Became more aware when I was rushing and slowed down. Probably showed more self-control when faced with interpersonal conflict, practiced some more communication skills, such as breaking down what the person is saying.		
Effected behavior in negative, unspecified way <sup>d</sup>	3	2
Maybe holding more of a grudge.		
Led to participants being more assertive <sup>c</sup>	3	2
So more assertive as a result – asked for a computer course.		
Interfered with work <sup>d</sup>	3	2
Not really except for losing concentration on work because I have to think if there was a stressful event happening.		

<sup>a</sup> Does not add up to 100 due to rounding error. <sup>b</sup> No effect on behavior. <sup>c</sup> Positive effect on behavior. <sup>d</sup> Negative effect on behavior.

*Categorization of Responses, with Examples of Participants' Responses, to Item 4: How Daily Self-monitoring Affected Their Mood*

Code	Percentage of Participants <sup>a</sup>	<i>f</i>
Did not effect mood <sup>b</sup>	39	29
Helped lessen stress <sup>c</sup>	31	23
Found it a calming exercise. Possibly less stressful because it made me more thoughtful.		
Increased stress <sup>d</sup>	26	19
More stressed. Having to focus on daily events this way somehow made it worse. More stressed, as I felt somewhat pressured to answer all the questions – some of the questions seemed involved.		
Increased awareness of feelings <sup>e</sup>	3	2
Neither more or less, just a heightened awareness. More in touch with feelings.		
Both increased stress and decreased stress <sup>e</sup>	1	1
A little more stressed – DD [daily diary] was another thing she had to worry about accomplishing on busy days. But also less stressed – DD gave her opportunity to vent/forget about stressor.		

<sup>a</sup> Does not add up to 100 due to rounding error. <sup>b</sup> No effect on mood. <sup>c</sup> Positive effect on mood.

<sup>d</sup> Negative effect on mood. <sup>e</sup> Mixed effect on mood.

## Appendix E: Initial Contingency Tables for Research Question 3

*Contingency Table Showing Self-reported Changes in Behavior by Changes in Mood*

Behavior	Mood			
	No Change	Negative Effect	Positive Effect	Mixed Effect
No Change	25	12	11	2
Negative Effect	0	4	0	0
Positive Effect	5	4	12	1

*Contingency Table Showing Self-reported Changes in Behavior by General Effect*

Behavior	General Effect			
	No Change	Negative Effect	Positive Effect	Unspecified Effect
No Change	6	14	25	5
Negative Effect	0	3	1	0
Positive Effect	0	3	18	1

*Contingency Table Showing Self-reported General Effect by Changes in Mood*

Mood	General Effect			
	No Change	Negative Effect	Positive Effect	Unspecified Effect
No Change	6	5	15	4
Negative Effect	0	11	7	2
Positive Effect	0	2	21	0
Mixed Effect	0	2	1	0



Appendix F: Categories of Responses for Items 2, 5, and 6 of the Effects of Participation  
Form

*Categorization of Responses, with Examples of Participants' Responses, to Item 2: Whether the Way They Filled Out Diaries Changed Over Time*

Code	Percentage of Participants <sup>a</sup>	<i>f</i>
Became more sensitive	42	31
<p>A little, think more carefully.</p> <p>I became more sensitive to how I felt and how I interacted with my boss and supervisors.</p> <p>I felt more sensitive to how I felt and took more care in answering questions.</p>		
No change in how completed forms	37	27
<p>No, took it seriously every time.</p> <p>I completed the forms the same way throughout.</p>		
Became more rote	11	8
<p>I think I became more rote as time went on.</p> <p>Yes, I did kind of get rushed with the lunch hour form. I quite often feel that I would rather not think about the work situation.</p>		
Indicated sometimes more sensitive, sometimes more rote	11	8
<p>It depended on how I felt. If I was tired, it was more rote. If I was relaxed I tended to think and dwell a bit more.</p> <p>Sometime I just flew through, not enough time, but other days I felt I was getting more insight from the questions.</p>		

<sup>a</sup> Does not add up to 100 due to rounding error.

*Categorization of Responses, with Examples of Participants' Responses, to Item 5: Whether or Not They Spoke to Anyone About the Questions on the Forms*

Code	Percentage of Participants <sup>a</sup>	<i>f</i>
No	72	53
Yes Only very generally. I told a couple of people that I was participating in the survey. Often filled out lunch diary in cafeteria. Explained what I was doing.	28	21

<sup>a</sup> Does not add up to 100 due to rounding error.

*Categorization, with Examples of Participants' Responses, to Item 6: Final Comments*

*Regarding Impact of Recording on a Daily Basis*

Code	Percentage of Participants <sup>a</sup>	<i>f</i>
No further comments	35	26
Increased awareness	26	19
<p>It made me realize that I need to do something about the way that stress affects me and make some positive change in my life.</p> <p>Yes. It had a positive impact, in that I realize how I react to situations. The greatest impact was in realizing that I react to certain situations differently each day.</p>		
Comment on procedure	20	15
<p>It is more stressful to fill out 2...than to fill out just one with more stressful event on it.</p> <p>Thought there should be more questions regarding how work stress influenced personal life.</p> <p>Because it takes up just a small amount of time there are no difficulties in doing them.</p>		
Was arduous/stressful	11	8
<p>Yes, I felt it was time consuming.</p> <p>Some days they added a great deal of stress, particularly if I was tired, not well, or had worked late.</p> <p>Wouldn't do it again, too much time involved!</p>		
Provided an opportunity to vent	8	6
<p>I could write it down and then dump it.</p> <p>Helps to write out problems.</p> <p>It seemed like a good outlet for me.</p>		

<sup>a</sup> Does not add up to 100 due to rounding error.