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Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA, MERCED

Randomized Controlled Trial to Evaluate Written Disclosure as Treatment for Parents of
Children with Autism Spectrum Disorders

A dissertation submitted in partial satisfaction of the requirements
for the degree of Doctor of Philosophy

in

Psychological Sciences

by

Nikko Symonne Da Paz

Committee in charge:

Professor Jan L. Wallander, Chair
Professor Anna V. Song
Professor Jitske Tiemensma

2016

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The Dissertation of Nikko Symonne Da Paz is approved, and it is acceptable
in quality and form for publication on microfilm and electronically:

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Assistant Professor
Psychological Sciences

University of California, Merced

2016

Dedication

This Dissertation research is dedicated to the many families of children diagnosed with autism spectrum disorders (ASD). With the continual upsurge in the rates of ASD diagnoses, more parents require relief from the negative effects associated with their parenting experiences. As such, it is important to identify effective evidenced-based treatments to ameliorate the deleterious outcomes that might result. The improvement of health outcomes for parents of children with ASD is both significant and timely.

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Dr. William Shadish: It pains me that you passed away just weeks before my Dissertation Defense. I am honored to have learned from you. As a giant in your field, I am impressed by your humility. Thank you for always having an open door to discuss statistics, data, and anything quant. You are missed.

Dr. Jitske Tiemensma: I am honored to be your very first Doctoral student to graduate. You came to this University with a new and fresh passion for psychoneuroendocrinology. You have awakened a new passion in me. I thoroughly enjoy the collection and analysis of salivary cortisol. The hours in the lab running plates was solitary heaven. I look forward to continued research that connects objective data with subjective report. Thank you for bringing a new level of research to UC Merced.

Dr. Anna Song: Thank you for stepping in at the last minute to fill in for Dr. Shadish. I appreciated your thoughtful comments at my dissertation defense. As well, I have enjoyed interacting with you throughout my time as a graduate student. I equally appreciate that you recognize why this type of research means so much to me. Thank you for giving me the words to describe what I do.

My Family: First, my strong, intelligent, and beautiful Mother, Bobbie Doss. Thank you for the spirit of steadfastness. I have observed you overcome so many of life's obstacles. I get my strength and determination from you. My siblings: Berketa, Dennis, and Tarrick. Each of you have shaped me into the person that I am who dares to do just about anything. Thank you for your love and support. My children: Nomathemba, Olabisi, Evilasio, Jr., and Emilio. All that I do is for you. My gift is to be an inspiration to all of you. For my boys, you have expanded my patience, flexibility, and compassion. Because you view the world through the lens of autism, you have given meaning and significance to my research and my tireless work for families of children with autism.

My Wonderful Husband, Evilasio Da Paz, Sr.: You are my strength personified. You were always there as my confidant, my counselor, my cheerleader. Thank you for taking on so many roles in our family so that I could have the freedom to pour myself into my research. Because of your constant, never-wavering love and support, you have earned an honorary doctorate in "Spouse-ology." Thank you Dr. Evilasio Da Paz.

Curriculum Vitae

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Los Banos, CA 93635
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Education

2016 Ph.D., University of California, Merced, Health Psychology
2016 M.A., California State, Stanislaus, Psychology (Behavior Analysis)
1994 B.A., Stanford University, Psychology

Research Experience

2014-16 **Research Project Manager.** University of California, Merced, CA
Project Title: Examining Stress in Caregivers of Children with Autism

2015 **Research Project Manager.** California State University, Turlock, CA
Project Title: Improving Social Skills between Children with Autism and Their Siblings

2011-12 **Research Project Manager.** University of California, Merced, CA
Project Title: Training Question-Asking Behavior in Children with Autism

2001-05 **Research Project Manager.** Stanford University, Palo Alto, CA
Project Title: Stanford GEMS (Girls health Enrichment Multi-site Studies). Funding Agency: NIH/NHLBI

2000-01 **Research Assistant.** Stanford University, Palo Alto, CA
Project Title: Stanford GEMS (Girls health Enrichment Multi-site Studies). Funding Agency: NIH/NHLBI

Employment

2015-16 **Behavior Specialist.** Learning ARTS, Sacramento, CA
Supervise behavior technicians in the implementation of applied behavior analysis interventions to children with autism spectrum disorders. Evaluate in-home delivery of individualized interventions and revise treatment plans as needed. Responsible for quarterly reports, data analysis, managing staff, and consultation with parents/caregivers.

- 2015
Spring **Behavior Analyst Intern.** John F. Kennedy School, Modesto, CA
Conducted functional behavior assessments, wrote behavior intervention plans, presented BIP reports at IEP's, designed and implemented numerous behavior management systems. Worked in conjunction with BCBA supervisor to train staff on implementation of applied behavior analysis techniques. Worked with children of various diagnoses including autism, Down's syndrome, and ADHD.
- 2010-12 **Parent Education Coordinator.** Merced County Office of Education, Merced, CA
Trained as a Positive Discipline Parent Education Facilitator to deliver curriculum to parent groups. Responsible for facilitating and coordinating parenting classes for communities within Merced County. Worked in collaboration with several school districts and community agencies to secure class facilities, prepare site specific MOU's, and coordinate independent contractors to facilitate classes.
- 2009-11 **Parent Advocate/Group Facilitator.** Challenged Family Resources, Merced, CA Provided social support and information on local resources for parents whose children were recently diagnosed with autism. Served as IEP support and liaison for local school districts. Also responsible for facilitating inclusion play groups for parents and children ages birth to 5 years. Collaborated with district and city administrators in securing facility usage. Worked in conjunction with Merced County Office of Education professionals to receive parent referrals.
- 2007-09 **Inclusion Specialist / Home Tutor.** Los Banos, CA
Served as the 1:1 aide for a 2 ½ year old child diagnosed with autism. Attended daily pre-school classes and implemented visual supports such as visual schedules and visual prompting (flash cards). Facilitated social interaction with peers through structured games and playground activities. Worked in conjunction with teachers and support staff to foster a positive inclusion placement for the child. Also implemented daily discrete trials to teach basic academic skills (e.g. letter recognition, writing, and basic math concepts) and functional skills (e.g. mands, tacts, toileting, dressing, etc.).
- 2000-05 **Research Project Manager. Stanford Prevention Research Center. Stanford University.** Palo Alto, CA.
Managed an NIH health education grant focusing on obesity prevention in multi-cultural adolescents. Responsible for hiring, training, and supervising full-time staff interventionists, data collectors, and part-time instructors chosen to implement a social science research study. Created training modules to successfully train staff in the enrollment of participants and the implementation of scientific evaluation tools. Other duties include: writing and revising scientific protocols, writing and

revising educational materials for interventions, community outreach, participant recruitment and retention, providing recruitment presentations, developing a social science intervention curriculum, screening and enrollment of prospective subjects, data collection, generating summary data reports, establishing and maintaining positive and professional relationships with staff in community site locations.

- 1996-98 **Inclusion Specialist / Home Tutor.** Easter Seals of Central California. Aptos, CA
As a Stanford student, began interning with an afterschool program for children with autism. Professionally, continued working with this population in the area of improving communication and building social skills. Utilized applied behavior analysis techniques to shape appropriate behavior. Responsible for running discrete trials, adapting elementary school curriculum, and creating lesson plans to suit the needs of the students. Worked in conjunction with school teachers in order to assure the completion of the child's IEP goals. Worked both in school and home settings.

News/Awards

- August 2015 **Merced Sun-Star.** Front page article covering dissertation research. Ana B. Ibarra. "UC Merced study sheds light on challenges faced by parents of autistic children."
- August 2015 **KCBS Radio News.** Live interview covering current research on challenges faced by parents of children with autism.
- 2014-16 **Governor Appointed Area VIII Board, State Council on Developmental Disabilities.** California multi-county jurisdiction.
- 2016 **Dean's Award of Excellence**
California State University, Stanislaus
- 2016 **2015-2016 Outstanding Student Achiever for the Psychology (MA) program**
California State University, Stanislaus

Fellowships/Grant Awards

- 2016 **Health Psychology Research Dissemination Award (\$4,454)**
University of California, Merced
- 2016 **John G. Borkowski Diversity Travel Award (\$400)**
University of California, Davis

- 2015-16 **Student Engagement in Research, Scholarship, and Creative Activities (SERSCA) Travel Grant Award** (\$1,000)
California State University, Stanislaus
- 2015-16 **Teaching Fellowship** (\$43,470)
University of California, Merced
- 2014-15 **Faculty Mentor Fellowship Award** (\$34,903)
University of California, Merced
- 2014-15 **Graduate Bobcat Award** (\$4,570)
University of California, Merced
- 2012-13 **Psychological Sciences Fellowship Award** (\$7,070)
University of California, Merced
- 2011-12 **Psychological Sciences Fellowship Award** (\$3,885)
University of California, Merced
- 2011-14 **Teaching Fellowship** (tuition + stipend)
University of California, Merced

Certifications

- 2014-
present **Pipetting Certification.** Psychoneuroendocrinology Lab
University of California, Merced
- 2010-
present **CITI Training/Human Research**
University of California, Merced

Publications

Journal Articles

Da Paz, N. S. and Wallander, J. L. (under review). Interventions that target improvements in mental health for parents of children with autism spectrum disorders: A narrative review. *Clinical Psychology Review*.

(published under **Nikko S. Thompson**)

Robinson, T. N., Kraemer, H. C., Matheson, D. M., Obarzanek, E., Wilson, D. M., Haskell, W. L., Pruitt, L. A., **Thompson, N. S.**, Haydel, K. F., Fujimoto, M., Varady, A., McCarthy, S., Watanabe, C., Killen, J. D. (2008). Stanford GEMS phase 2 obesity prevention trial for low-income African American girls: design and sample baseline characteristics. *Contemporary Clinical Trials*, 29(1), 56-69.

- Beech, B. M., Kumanyika, S. K., Baranowski, T., Davis, M., Robinson, T. N., Sherwood, N. E., Taylor, W. C., Relyea, G., Zhou, A., Pratt, C., Owens, A., **Thompson, N. S.** (2004). Parental cultural perspectives in relation to weight-related behaviors and concerns of African American girls. *Obesity, 12*, 7s-19s.
- Robinson, T. N., Matheson, D. M., Kraemer, H. C., Wilson, D. M., Obarzanek, E., **Thompson, N. S.**, Alhassan, S., Spencer, T. R., Haydel, K. F., Fujimoto, M., Varady, A., Killen, J. D. (2010). A randomized controlled trial of culturally tailored dance and reducing screen time to prevent weight gain in low-income African American girls. *Pediatrics & Adolescent Medicine, 164*(11), 995-1004.
- Robinson, T. N., Killen, J. D., Kraemer, H. C., Wilson, D. M., Matheson, D. M., Haskell, W. L., Pruitt, L. A., Powell, T. M., Owens, A. S., **Thompson, N. S.**, Flint-Moore, N. M., Davis, G. J., Emig, K. A., Brown, R., T., Rochon, J., Green, S., Varady, A. (2003). Dance and reducing television viewing to prevent weight gain in African American girls: the Stanford GEMS pilot study. *Ethnicity & Disease, 13*, 1-13.
- Story, M., Sherwood, N. E., Obarzanek, E., Beech, B. M., Baranowski, J. C., **Thompson, N. S.**, Owens, A. S., Mitchell, M., Rochon, J. (2003). Recruitment of African American pre-adolescent girls into an obesity prevention trial: the GEMS pilot studies. *Ethnicity & Disease, 13*, 1-10.

Presentations

- | | |
|------------------|--|
| 2016
February | Gatlinburg Conference on Research and Theory in Intellectual and Developmental Disabilities. San Diego, CA
Symposium Title: Association of illness perceptions and subjective stress with health-related quality of life and salivary cortisol levels in caregivers of children with autism spectrum disorders |
| 2016
January | Association for Behavior Analysis International Autism Conference. New Orleans, LA
Poster Title: Using video modeling to improve social skills between children with autism and their siblings (with B. E. Hesse) |
| 2014
February | Association for Behavior Analysis International Autism Conference. Louisville, KY
Poster Title: Training question-asking behavior in children with autism spectrum disorders (with R. M. Scott) |
| 2014
March | UC Merced 1st Annual Research Week. Merced, CA
Poster Title: Training question-asking behavior in children with autism spectrum disorders (with R. M. Scott) |

Teaching

Teaching Assistant

- Spring, 2016 **Evolutionary Psychology.** University of California, Merced
- Fall, 2015 **Abnormal Child Psychology.** University of California, Merced
- Spring, 2014 **Introduction to Psychology.** University of California, Merced
- Fall, 2013 **Health Promotion & Behavior.** University of California, Merced
- Spring, 2013 **Introduction to Psychology.** University of California, Merced
- Fall, 2012 **History of Psychology.** University of California, Merced
- 2011 - 2012 **Introduction to Psychology.** University of California, Merced

Guest Lecturer

- Oct, 2013 **Health Promotion & Behavior.** University of California, Merced, CA
Topic: Social Network
- Oct, 2013 **Health Promotion & Behavior.** University of California, Merced, CA
Topic: Stress and Coping
- April, 2013 **Introduction to Psychology.** University of California, Merced, CA
Topic: Childhood Disorders
- April, 2012 **Introduction to Psychology.** University of California, Merced, CA
Topic: Childhood Disorders
- Nov, 2011 **Introduction to Psychology.** University of California, Merced, CA
Topic: Childhood Disorders
- 2010-11 **Positive Discipline Parenting.** Merced County Office of Education,
Merced, CA
Role: Certified Positive Discipline Parent Educator

Professional Memberships

- Since 2014 **California State Council on Developmental Disabilities.** Board Member
- Since 2013 **Association for Behavior Analysis International.** Member

Abstract

Parents of children with autism spectrum disorders experience poorer health and greater stress than parents in the general population. With prevalence rates of ASD rapidly increasing, it is imperative to identify effective interventions targeting parent health and well-being. Investigations of written disclosure (WD) have shown promising results in the general population but a paucity of research has evaluated WD with parents of children with ASD. Further, subjective reports have traditionally provided evidence for treatment efficacy. To address these limitations, we conducted a randomized controlled trial with 71 parents of children with ASD (ages 23 to 62 years; $M = 38.0$, $SD = 10.35$). At baseline and 6-month follow-up, we evaluated self-reported health (global health, perceived stress, parenting stress, and caregiver strain) and objective biomarkers (salivary cortisol and ambulatory blood pressure). We hypothesized that parents who wrote about traumatic events (treatment) would display better health compared to parents who wrote about a neutral topic (control). As expected, treatment parents displayed more robust cortisol activity, $F(1,52) = 12.08$; $p = .002$, and reported less perceived stress, $F(1,56) = 9.14$; $p = .004$. While conditions did not differ at follow-up, parenting stress ($F(1,56) = 7.64$; $p = .008$) and caregiver strain ($F(1,56) = 6.46$; $p = .014$) were reported significantly better for all parents over time. There were no differences between conditions in global health and blood pressure. Thus, results partially support WD as an effective treatment for parents of children with ASD. Given the small sample size, caution is warranted for generalizability.

Keywords: autism spectrum disorders, parent intervention, stress reduction, written disclosure

Randomized Controlled Trial to Evaluate Written Disclosure as Treatment for Parents of
Children with Autism Spectrum Disorders

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Randomized Controlled Trial to Evaluate Written Disclosure as Treatment for Parents of Children with Autism Spectrum Disorders

Introduction

Whereas some research has indicated positive outcomes associated with parenting a child with autism spectrum disorders (ASD), such as increased spirituality (Ekas, Whitman, & Shivers, 2009), acceptance of differences, and heightened compassion (Pakenham, Sofronoff, & Samios, 2004), accumulating evidence maintains that a large majority of affected parents experience negative psychological outcomes and deleterious health consequences. In comparison to parents of typically functioning children or parents of children with other developmental disabilities (i.e. Down's syndrome or cerebral palsy), parents or caregivers of children with ASD sustain a higher incidence of negative psychological problems, such as depression, anxiety, and emotional distress (Mugno, Ruta, D'Arrigo, & Mazzone, 2007). From a physiological perspective, their profile includes diminished global health (Allik, Larsson, & Smedje, 2006), high rates of reported bodily pain (Khanna et al., 2011), and irregularities of the endocrine system caused by chronically high levels of stress-induced cortisol secretions (Lovell, Moss, & Wetherell, 2012).

Due to the challenges and adverse consequences that parents experience, and the size of the affected population with a prevalence of 1:68 children being diagnosed with ASD (Wingate et al., 2014), effective treatment to improve parent's psychological health is essential. However, interventions targeting parents commonly consist of two modalities: (1) parent training, targeting the improvement of parenting skills for dealing with difficult child behaviors, and (2) parent education, providing information to shape parental expectations and understanding of the child's behavior (Kaminski, Valle, Filene, & Boyle, 2008). Thus, rather than targeting parent outcomes, researchers have evaluated the effectiveness of these programs on outcomes specific to *children with ASD*, such as improvement in language skills (Matson, Mahan, & Matson, 2009), development of social skills (McConachie & Diggle, 2007), and behavior management (Brookman-Frazer, Stahmer, Baker-Ericzén, & Tsai, 2006). Parent effects were only considered collateral and not targeted directly.

With the continual upsurge in the rates of ASD diagnoses (Blumberg et al., 2013), more parents will require relief from negative psychological effects associated with their caregiving experiences. In light of this, researchers have begun to evaluate treatments for parents of children with ASD that target improvement in psychological illness (e.g. depression, anxiety, and psychological distress) (Feinberg et al., 2014) and/or psychological well-being (e.g. life satisfaction, self-compassion, and personal growth) (Benn, Akiva, Arel, & Roeser, 2012). Interventions that appear promising include: stress management and relaxation techniques, mental training exercises aimed at improving emotional awareness and regulating behavioral responses (Benn et al., 2012); written disclosure, an act of disclosure that allows an individual to share their thoughts or feelings about a traumatic event in a nonthreatening environment (Campbell, 2003); mindfulness training, a process of deliberate awareness and nonjudgmental acceptance of thoughts and feelings in the present moment (Dykens, Fisher, Taylor, Lambert, &

Miodrag, 2014); and Acceptance and Commitment Therapy, nonjudgmental acceptance of negative or uncomfortable emotions combined with cognitive diffusion to disrupt negative cognitions associated with those emotions (Blackledge & Hayes, 2006). On average, treatments produced medium to large effect sizes with reported improvements in parenting stress and general health, and reductions in depression and anxiety (Da Paz & Wallander, 2016).

Whereas these intervention efforts are commendable, certain reoccurring factors have contributed to study limitations. First, intervention efficacy has often been assessed through self-report (Brookman-Frazer et al., 2006). High-quality objective measures of effects on stress in the form of cortisol reactivity, for example, has received limited attention in the evaluation of parent psychological treatment. Secondly, only a select few have utilized randomized controlled trials, the gold standard for testing intervention efficacy (Shadish, Cook, & Campbell, 2002). Finally, beyond the domain of research, prohibitive costs typically associated with several of these approaches might serve as deterrents or barriers to treatment in today's health care environment (Wallander, Madan-Swain, Klapow, & Saeed, 2011).

In an effort to address these limitations and the evident need for parent intervention, the current study seeks to provide a cost effective treatment to improve their health and well-being. For this purpose, we selected written disclosure (WD) due to its practicality and evidence-based efficacy. Developed by Pennebaker and colleagues in 1986, WD has resulted in significant improvements in both the physical and psychological health of numerous populations, from healthy college students (Pennebaker & Beall, 1986) to adolescents experiencing symptoms of asthma (Warner et al., 2006). The procedure is a simple one. Participants are randomly assigned to one of two conditions, the WD condition that writes about the most traumatic experience of their lives or control condition that writes about a neutral topic (e.g. your daily activities). Participants typically write for 20 minutes on three occasions. Health improvements are usually observed 3-6 months later, and typically not immediately post-treatment, despite only requiring three 20 minute sessions of uninterrupted writing, making it extremely economical and convenient. Although WD has documented efficacy in the general population (Frattaroli, 2006), patient groups (Stanton et al., 2002), and select groups of family caregivers (Schwartz & Drotar, 2004), research is lacking in examining its efficacy with parents of children with ASD.

Hence, the specific aims of the present study are to evaluate, using a randomized controlled design, the effects of WD on (1) physiological indicators of health including participant stress reactivity as measured by salivary cortisol as well as resting blood pressure; and (2) subjective health as measured by self-reported global health and parenting stress. We hypothesize that parents who write about traumatic events in the treatment condition will display better health compared to parents in the control condition who write about a neutral topic.

Method

Recruitment and Enrollment

Participants were recruited via several agencies that serve caregivers of children with ASD, including state-funded regional centers, in-home behavioral support agencies, specialized learning centers, and local school districts. Over a period of 18 months, five waves of recruitment flyers were provided for agency distribution via mail (3,170) or school distribution via classrooms (450) totaling 3,620 flyers. Interested parents voluntarily called or emailed the research lab. This yielded 121 screened participants. Eligibility criteria stipulated that a participant: (1) was the primary caregiver of a child diagnosed with ASD; (2) would provide documentation (i.e., psychologist report from school, pediatrician, or regional center) of the child's previous ASD diagnosis; and (3) the child with ASD was between the ages of 3 and 18 years. Only three were ineligible for not having a qualifying child with ASD. A further 16 declined participation, citing issues with family, time conflicts, transportation, or wanting parenting classes on stress and autism (see Figure 1). The remaining 102 were scheduled for baseline assessment appointments, but 31 did not show up for their appointment and efforts to reschedule were unsuccessful. In total, the study enrolled 71 parents.

Participant Characteristics

Participant descriptive statistics are in Table 1. The average age of the participants was 39.66 years ($SD = 10.11$) and 93% were female. The average age of the child with ASD was 8 years old ($SD = 4.5$ years) with almost 50% of the children within 3 – 6 years old. The sample was 48% Hispanic and 33% Caucasian. A majority of participants were married or cohabitating with a significant other (73%), 20% were divorced or separated, and 7% were single or widowed. A majority either attended or graduated from college (54%), but almost one third had a high school diploma or less (32%). Whereas annual household incomes ranged from less than \$10,000 (18%) to greater than \$100,000 (14%), most families reported annual incomes between \$10,000 and \$39,999 (31%). In terms of English proficiency, 93% of the parents rated themselves as proficient. A majority of parents cared for 2 – 3 children (62%) whereas only 30% received respite. When asked about their child with ASD's school placement, 72% reported they were satisfied.

Procedures

Screening and scheduling procedures. Participants were screened via phone to determine eligibility prior to scheduling an assessment and intervention appointment. Participants who were eligible and elected to participate were mailed a package that included a study welcome letter indicating package contents and next steps, a copy of the informed consent form, saliva collection instructions, four saliva collection tubes, and an appointment reminder postcard with details of the assessment appointment.

Assessment procedures. Appointments were held in several community locations. First author or a research assistant presented the assessment script and psychosocial instruments using the Qualtrics Research Suite software (© 2015 Qualtrics). Several components occurred during the first appointment: (a) informed consent obtained; (b) saliva samples collected; (c) ASD diagnosis verification collected; (d) blood pressure and resting heart rate collected; (e) completion of psychosocial questionnaires; (f) randomization into conditions; and (g) completion of the first 20 minute intervention session. Follow-up assessments, conducted six months (range 24-28 weeks) after completion of the baseline assessment, included: (a) collection of saliva samples, (b) collection of blood pressure and resting heart rate, and (c) completion of psychosocial questionnaires. Upon completion of the follow-up assessment participants received a \$25 gift card.

Outcome Measures

Health-related quality of life (HRQOL). HRQOL was assessed with the RAND 36-item self-report Health Survey version 2 (SF-36) (Ware & Sherbourne, 1992), a self-report instrument that measures HRQOL in eight domains: (1) physical functioning; (2) limitations because of physical health problems; (3) bodily pain; (4) social functioning; (5) general mental health (psychological distress and psychological well-being); (6) limitations because of emotional problems; (7) vitality (energy/fatigue); and (8) general health perceptions. The questionnaire asks whether physical or emotional health symptoms have interfered with daily activities. Responses are provided in several categorical formats (e.g. *yes/no*; *not at all – extremely*; *all of the time – none of the time*; *definitely true – definitely false*). In group comparisons of patients with clinical depression and depressive symptoms, the SF-36 supports construct validity and internal-consistency reliability ranges from $\alpha = .77$ to $.94$, with a median of $.82$ (McHorney, Ware Jr, Lu, & Sherbourne, 1994). Scoring is obtained by recoding all values to a 0-100 point scale, averaging and then summing each subscale for a total score. A higher score indicates better HRQOL.

Perceived stress. The participant's perception of general stress was evaluated with the 10-item self-report Perceived Stress Scale (PSS) (Cohen & Williamson, 1988), which uses a 5-point Likert response scale ranging from 0 (*never*) to 4 (*very often*). Participants were asked how often they have felt a certain way in the last month. Total stress score is calculated by summing all items, with a higher score indicating greater perceived stress. The PSS demonstrated high internal-consistency reliability ranging from $\alpha = .78 - .91$. Construct validity is supported by significant correlations between the PSS and depressive symptomatology (Cohen, Kamarck, & Mermelstein, 1983).

Parenting stress. Stress associated with parenting was assessed with the 36-item self-report Parenting Stress Index-Short Form (PSI-SF) (Abidin, 1990). Derived from the full 120-item PSI, the PSI-SF contains three subscales: (1) difficult child, (2) parental distress, and (3) parent-child dysfunctional interaction. Each subscale contains 12 items measured on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A total PSI score is calculated by summing each subscale total, with a higher score indicating greater perceived parenting stress. Total score on the PSI-SF correlated $.94$ with the total score on the full-length PSI, demonstrating high internal consistency.

Extensive psychometric analyses and widespread use in research contexts support the construct validity of the PSI-SF as a measure of parenting stress (Haskett, Ahern, Ward, & Allaire, 2006).

Caregiver strain. The burden of caring for the child with ASD was assessed with the Caregiver Strain Questionnaire (CGSQ), a 21-item self-report scale that was designed for use with primary caregivers of children and adolescents with emotional and behavioral problems (Brannan, Heflinger, & Bickman, 1997). The scale measures strain within three domains (1) objective caregiver strain, observable negative events resulting from caring for the impaired individual; (2) subjective internalized caregiver strain, caregiver's feelings of the strain related to those negative events; and (3) subjective externalized strain, caregiver's feelings towards the child. The caregiver is asked, "How much of a problem each occurrence or feeling was in the past 6 months as a result of your child's problems?" Responses are provided on a 5-point Likert scale ranging from 1 (*not at all a problem*) to 5 (*very much a problem*). The scale demonstrated high internal-consistency reliability between $\alpha = .74$ and $.93$ across scales. Validity was supported by a negative correlation with family functioning (Brannan et al., 1997). Total score is calculated by first averaging the three subscale items, then summing the average scores of those subscales. The higher the total score, the higher the caregiver's perception of strain associated with caring for the impaired child.

Salivary cortisol. To capture biomarkers of stress, we collected salivary cortisol (Csal). Normal functioning of the hypothalamic-pituitary-adrenal (HPA) axis is characterized by a rise in concentration of cortisol during the first 30 minutes of consciousness, the cortisol awakening response (CAR), with a steady decline throughout the day (Kirschbaum & Hellhammer, 2000). A low volume of early morning cortisol output is an indicator of abnormal HPA activity (Miller, Chen, & Zhou, 2007). Following standard procedures (Wüst, Federenko, Hellhammer, & Kirschbaum, 2000), we collected caregiver Csal at waking and 30 minutes post-waking on two consecutive weekdays. We calculated CAR as the average change in cortisol levels across both collection days, separately at baseline and six-month follow-up.

Saliva samples were collected using a Salimetrics SalivaBio Oral Swab (SOS). Participants were mailed collection kits that included: four SOS collection tubes labeled with participant ID and collection number; a plastic bag labeled with participant ID for storing collected samples; and both written and pictorial collection instructions. For quality assurance, the instructions also informed participants to refrain from foods with high sugar, acidity (e.g., orange juice), and high caffeine content (e.g., coffee or energy drinks) for 12 hours preceding the sample collection. In addition, participants were instructed to not eat, drink, nor brush their teeth prior to the sample collection. To ensure collection fidelity, the first author or a research assistant called participants in the morning at an agreed upon time when the participant expected to wake up. They followed a protocol script to guide participants through the collection process. After two days of saliva collection, participants brought their samples to their assessment appointment. All samples were stored in a below zero freezer. Thawed samples were centrifuged, then salivary cortisol was analyzed using an enzyme immunoassay (Dorn, Lucke, Loucks, & Berga, 2007).

Blood pressure and resting heart rate. Using the participant's non-dominant arm, blood pressure (BP) and resting heart rate (HR) were assessed following standard procedures (McGuire, Greenberg, and Gevirtz (2005REFS)). Arterial measurements were taken three times, separated by two minutes, using an Omron 10 Plus series upper arm blood pressure monitor. Participants were instructed to sit quietly with their feet flat on the floor, back resting against the chair, and arm resting on the table. Scores were averaged across the three measurements for each participant to obtain a total BP and HR measure.

Intervention Conditions

Participants were given a 20 minute writing task to be completed on each of three days. The first day of writing was conducted at the baseline assessment appointment when participants were randomly assigned to one of two writing conditions: (1) WD treatment condition where participants wrote about the most traumatic experience in their lives (see Schwartz & Drotar, 2004 for exact script), or (2) control writing condition, where they wrote about a neutral topic. The participant completed the two remaining writing tasks according to the same instructions within the next five days in their homes or a location of their choosing. To assist with intervention adherence, the first author or research assistant phoned the participant at an agreed upon time to reiterate the writing instructions and remind them to complete their writing tasks. Participants also received a reminder call to mail their writing, if it had not been received within a week after their last scheduled writing task.

Statistical Analysis

Analyses were conducted using SPSS, Version 23 (SPSS Inc., 2014). We performed independent t tests and χ^2 analyses, where applicable, to test for baseline group differences in demographics and outcome measures. We conducted a univariate analysis of variance (ANOVA) to assess whether baseline outcomes predicted attrition at follow-up. Using a two-tailed test of significance with baseline scores as covariates, we performed a univariate analysis of covariance (ANCOVA) to test differences between WD and Control conditions in improving health and well-being over time for parents of children with ASD. In the case of significant results, we reported partial eta-squared and computed effect sizes using Cohen's d (Cohen, 1990).

Cortisol data was positively skewed and required a logarithmic transformation to normalize the distribution. At baseline assessment, 17 parents (24%) did not produce enough saliva for cortisol analysis making it impossible to calculate CAR scores in these cases. In addition, one CAR value was greater than four SDs above the mean, which was deemed an outlier and removed from analysis, leaving 53 participants in the baseline analysis sample for CAR. At the 6-month follow-up, 58 parents provided saliva samples, but 29% of the samples (17 samples) did not contain sufficient saliva for cortisol analysis. One CAR value was deemed an outlier ($CAR \geq 4$ SDs) and removed from analysis, leaving 40 participant samples in the follow-up analysis for CAR.

Results

Preliminary Analyses and Attrition

Conditions did not significantly differ on demographic and child-related variables (see Table 1) or treatment outcomes at baseline (see Table 2). Caregiver strain and health-related quality of life at baseline significantly predicted attrition at the 6-month follow-up assessment. Parents lost to follow-up reported higher caregiver strain ($M = 67.38$ vs. 52.05 ; $F(1,69) = 7.70$; $p = .007$) and poorer overall health ($M = 47.28$ vs. 61.90 ; $F(1,69) = 7.15$; $p = .009$) compared to parents who completed all assessments. In some cases ($n = 17$ at baseline and $n = 17$ at 6-month follow-up), parents did not produce enough saliva for cortisol assay analysis, resulting in missing data. We dummy-coded two groups, parents with viable cortisol samples and parents whose samples were impossible to analyze due to insufficient saliva, then conducted independent t-tests to examine group differences. Parent groups did not significantly differ in any demographic or outcome variables at baseline or 6-month follow-up.

Treatment Outcome Analysis

Health-related quality of life. Parent-reported global health did not differ over time and intervention conditions did not differ significantly at follow-up.

Perceived stress. Over time, parents in both conditions experienced significant reductions in perceived stress, $F(1,56) = 6.91$; $p = .011$. As shown in Table 2, parents who wrote about traumatic events reported less perceived stress at the 6-month follow-up, $F(1,56) = 9.14$; $p = .004$, compared to parents who wrote about a neutral topic. Overall, the model predicted 14% variation in parents' report of perceived stress with a small effect size of $d = .19$.

Parenting stress. While conditions did not differ at the 6-month follow-up assessment, parenting stress was reported significantly better for all participants over time, $F(1,56) = 7.64$; $p = .008$.

Caregiver strain. Results indicated a significant effect of time on caregiver strain, $F(1,56) = 6.46$; $p = .014$. However, means for conditions did not differ at follow-up when covarying baseline values.

Salivary cortisol. We hypothesized that in comparison to parents in the control condition, parents in the treatment would display more robust cortisol activity at follow-up assessment. As expected, ANCOVA results indicated a significant treatment effect at 6-month follow-up, ($F(1,52) = 12.08$; $p = .002$). As shown in Table 3, the model predicted 34% variability in cortisol concentrations with a large effect size of $d = 1.27$. Further analysis of cortisol output at waking revealed a significant difference between conditions at 6-month follow-up ($F(1,52) = 4.74$; $p = .039$). Specifically, parents who disclosed traumatic events displayed significantly higher levels of waking cortisol ($M = 12.39$ vs. 6.62) compared to parents in the control condition who wrote about a neutral topic. Graphical examination of cortisol concentrations in the control condition revealed a flattened or blunted slope from waking to 30 minutes post-waking (see Figure 2). Contrarily, parents in the treatment condition displayed significantly higher levels of cortisol secretions that decreased progressively within the first hour of waking.

On average, elevated waking cortisol output at follow-up assessment resulted in a negative CAR score for parents in the treatment condition. Follow-up analysis was conducted to evaluate whether those with positive CAR could be identified from those with inverted CAR. We conducted an independent t-test and evaluated group differences between positive versus negative CAR values. Groups did not significantly differ on any demographic or outcome variable.

Blood pressure and heart rate. There were no differences within nor between conditions in blood pressure or heart rate.

Discussion

Overall, the results of this study partially support the efficacy of written disclosure in improving stress-related outcomes at 6-month follow-up for parents of children with ASD. Specifically, parents who wrote about traumatic events experienced reductions in perceived stress and better cortisol reactivity compared to parents who wrote about a neutral topic. Whereas treatment effects varied between small and large, consistent with previous research on written disclosure, effects were larger for physiological compared to psychological health outcomes (Smythe, 1998). However, there were no differences due to intervention observed in health-related quality of life, parenting stress, caregiver strain, blood pressure, or resting heart rate.

Cortisol Response

The cortisol awakening response produced the largest effect size in the current study. Parents in the control condition who did not disclose traumatic events displayed lower cortisol output at follow-up compared to parents in the treatment condition. Low production of cortisol or hypocortisolism has been associated with chronic stress (Heim, Ehler, & Hellhammer, 2000; Miller et al., 2007) and documented in patients with chronic fatigue syndrome (Van Houdenhove, Van Den Eede, & Luyten, 2009) and post-traumatic stress disorder (Thaller, Vrkljan, Hotujac, & Thakore, 1999). Parents in the control condition displayed stress-induced hypocortisolism suggestive of an abnormal HPA profile.

In contrast, cortisol secretions of parents in the treatment condition displayed a significantly steeper albeit negative slope. Typically cortisol output at waking are at their lowest levels then peak 30 minutes later resulting in a positive CAR score. However, at the 6-month follow-up assessment, parents in the treatment condition displayed inverted cortisol activity with higher concentrations at waking yielding negative CAR scores. Although not the majority, instances of negative CAR are not uncommon and have been reported in 18% (Hansen, Garde, Christensen, Eller, & Netterstrøm, 2003) and 23% (Wüst, Wolf, et al., 2000) of healthy study participants, suggesting individual variability in HPA activity (Eek et al., 2006). In our study, 33% of participants at baseline assessment and 32% at follow-up assessment displayed negative CAR profiles. Previous studies classified healthy participants with negative CAR scores as “nonrespondents” (Eek et al., 2006) or “CAR nonresponders” (Dockray, Bhattacharyya, Molloy, & Steptoe, 2008). These inconsistent diurnal patterns might be suggestive of noncompliance to collection protocols. However, prior research that monitored participant waking with

electronic tracking ruled out noncompliance, irregular sleep patterns, and method of waking (e.g. alarm clock or naturally) as causes of inverted CAR (Dockray et al., 2008).

Whereas previous research reported socioeconomic status significantly predicted negative CAR in study participants (Dockrey et al., 2008), our findings were not consistent with these results. Parents with negative CAR did not differ on any demographic or outcome variable when compared to parents with positive CAR. Other researchers have suggested irregularities in cortisol reactivity to be associated with participant age (Alink et al., 2008; Platje et al., 2013). However, these previous investigations targeted participants maturing through adolescence and did not evaluate adult populations. Hence, the significant differences in waking cortisol levels of the WD condition and the control condition at 6-month follow-up suggest a systematic change yet to be explained. Future research employing larger sample sizes, electronic tracking of waking, additional saliva collections throughout the day, and a longitudinal examination of chronic stress experienced by parents of children with ASD might uncover key variables responsible for these inexplicable dissimilarities.

Psychological Outcomes

Current study results are consistent with previous WD research that demonstrated attenuated psychological outcomes in healthy and clinical populations (e.g. anxiety and depressive symptoms) after a period of four to six months following administration of WD treatment (Frattaroli, 2006; Smyth, 1998). However, all parents reported a significant decline in parenting stress and caregiver strain over time, regardless of condition allocation. Two possibilities might explain these positive effects. First, the neutral writing topic instructed parents to write about what they did last summer. Typically, school closures during summer months disturb the child's usual routine, especially for children with ASD, possibly resulting in a spike in disruptive behavior at home. Parents may have written about an emotionally traumatic summer even in the control condition, thus triggering similar effects as the WD condition. Secondly, during the debriefing interview after follow-up assessments were completed, parents were asked what was helpful about the writing intervention. Anecdotally, parents commented that the mere act of taking 20 minutes for themselves was beneficial regardless of the writing topic. Future research might investigate whether engaging in scheduled self-care activities produce similar results compared to written disclosure of traumatic events.

Treatment to Benefit Parents Directly

In respect to parents of children with ASD, researchers typically administered and evaluated the effects of two treatment modalities: (1) parent training, targeting the improvement of parenting skill in dealing with difficult child behaviors and (2) parent education, providing information to shape parental expectations and understanding of the child's behavior (Kaminski, Valle, Filene, & Boyle, 2008). However, over the past decade, a growing number of studies have targeted parent-focused outcomes such as maternal depression (Bristol, Gallagher, & Holt, 1993) and stress management (Peck, 1998) with methods ranging from biofeedback and parent-clinician partnerships (Bitsika & Sharpley, 2000; Brookman-Frazee, 2004) to massage interventions and manual-based stress reduction training (Cullen-Powell, Barlow, & Cushway, 2005; Tonge et al., 2006).

The current research joins this emerging trend by directly targeting improvement in parent outcomes, rather than relying on indirect collateral effects of child-focused treatment.

As treatment studies for parents of children with autism increase, the inclusion of objective data might aid in the identification of evidenced-based treatments that might otherwise get overlooked due to insignificant subjective results. In the case of WD, effect sizes have commonly shown greater magnitudes in physiological outcomes (Smyth, 1998), such as immune function (Sloan & Marx, 2004) and systolic blood pressure (Pennebaker, Hughes, & O'Heeron, 1987). Likewise, the current study found the physiological effects of cortisol reactivity ($d = 1.271$) to be stronger than the subjective outcome of perceived stress ($d = .193$). In contrast, this study did not detect a significant treatment effect in the objective measure of blood pressure assessed at the 6-month follow-up. Pennebaker et al. (1987) demonstrated a significant reduction in blood pressure for healthy college students immediately following disclosure of an extremely stressful event. Quite possibly, the treatment effect may have experienced a greater magnitude at a shorter interval post-intervention compared to six months later. Future studies might evaluate effects both at post-intervention and at time points before six months to better detect changes in treatment effect over time.

Limitations

Recruitment efforts that included almost 4,000 flyers and posters only yielded 3% (121 participants) assessed for eligibility. To protect the confidentiality of potential parents, recruitment sources did not provide access to any parent names or contact information. Consequently, parents had to initiate the screening process via phone or email. This process limited study enrollment resulting in a small sample size. As such, study results may not claim external generalizability. In addition, the small sample size underpowered the study, making it challenging to detect meaningful treatment effects. This is a common problem in studies with parents experiencing chronic stress combined with caring for a child with a behavior disorder such as ASD (Kazdin, 1990).

Although the intervention did not require much of the parents' time to complete (20 minutes per day for three days), the saliva collection was an arduous task. We called each participant at a scheduled waking time and 30 minutes later to guide them through accurate collection of the saliva samples. Parents indicated the times that they typically woke during weekdays, between four o'clock and eight o'clock in the morning. Parents were thus called twice per day for two days prior to baseline and follow-up assessment. On occasion, parents did not answer their phones or reported issues with their child with ASD that prevented them from answering the phone. These interferences prolonged the assessment process. In addition, a sizeable proportion of collected samples did not have sufficient saliva for assay analysis, further decreasing the sample size for analysis. In addition, saliva samples were only collected at waking and thirty minutes later across two days. Additional data points throughout the day and across more than two days might have provided a better profile of the participant's diurnal pattern. Nonetheless, the inclusion of objective data provided essential results in the evaluation of WD.

Implications

The exorbitant costs of therapeutic intervention for children with ASD and the time commitment required oftentimes prevent a parent's access to appropriate resources for his or her own health. WD is a portable and cost-effective treatment with demonstrated benefit to stress-related consequences for parents of children with ASD. Significant reductions in perceived stress and improvement in cortisol reactivity occurred after writing for only 20 minutes per day for three days. This small amount of time devoted to an intervention activity proved both feasible and efficacious. With the daily challenges of disruptive behavior and the social isolation that parents might face, being able to write for such a brief time with significant improvements six months later is a noteworthy finding.

Previous treatment-outcome studies for parents of children with ASD have relied on self-reported data to evaluate treatment efficacy. Objective biomarkers of stress tested within the framework of a randomized controlled-trial offers a robust method of investigation. Although the current study included an active treatment and an inactive control, both groups received gains in stress-reduction over time through the mere act of writing, regardless the topic. For the sake of offering ethical treatment to parents who may exhibit baseline levels of heightened stress or psychological pathology, two-armed treatments might offer an amenable solution.

Internalizing one's emotions has proven harmful and associated with negative health outcomes, like elevated stress and increased risk of illness. Social constraints limit individuals from participating in disclosure behavior, especially when the disclosure might reveal disheartening perceptions about one's own child. Oftentimes, parents of children with ASD have difficulty sharing the traumatic experiences that they endure on a daily basis. Even with healthy levels of perceived stress, parents may not be able to completely disclose the extent of their trauma. This inability to disclose might cause harm to overall well-being. WD allows for confidential self-disclosure without the stigma or shame associated with sharing experiences with others. In addition, psychological treatment requires consistent appointments outside of the home or excessive medical costs. Given the high demand of caring for a child with ASD, parents might also experience constraints that could interfere with potentially reinforcing social engagement or stress-reduction activities outside of the home. However, being able to simply write to evoke positive change to one's health and well-being is both needed and welcomed in a population of uniquely distressed caregivers.

Documented in the ASD literature are numerous challenges that a parent might face when caring for their child with ASD. These include disruptive child behavior, parental emotional distress, limited social interaction, and the financial burden of costly therapy for either the child or the parent. Individually, each of these concerns might have a negative impact on a parent's mental and physical well-being. Combined and experienced chronically over the course of several years, these issues have the potential to evoke extensive harm to the caregiver. With the continual upsurge in the rates of ASD diagnoses, more parents require relief from the negative effects associated with their parenting experiences. As such, it is important to identify effective evidenced-based treatments to ameliorate the deleterious outcomes that might result. The improvement of health outcomes for parents of children with ASD is both significant and timely.

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Table 1. Participant Descriptive Statistics by Treatment Condition at Baseline

Characteristic		WD (<i>n</i> = 36)		Control (<i>n</i> = 35)		Total (<i>n</i> = 71)	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender	Female	33	92	33	94	66	93
Age, mean (SD)		39.44 (10.29)		39.89 (10.06)		39.66 (10.11)	
Education	High School or less	11	31	12	34	23	32
	2 or 4 yr college	20	56	18	51	38	54
	Graduate degree	5	14	5	14	10	14
Marital status	Divorced/separated	10	28	4	11	14	20
	Married/cohabitate	24	67	28	80	52	73
	Single/widowed	2	6	3	9	5	7
Race	Hispanic/Latino	19	53	15	43	34	48
	Caucasian	9	25	16	46	25	32
	African American	3	8	2	6	5	7
	Asian	1	3	0	0	1	1
	Other	4	11	2	6	6	8
Annual income	>\$10,000	6	17	7	20	13	18
	\$10,000 - \$19,999	6	17	5	14	11	15
	\$20,000 - \$39,999	6	17	5	14	11	15
	\$40,000 - \$59,999	8	22	9	26	17	24
	\$60,000 - \$79,999	4	11	2	6	6	8
	\$80,000 - \$99,999	2	6	1	3	3	4
	<\$100,000	4	11	6	17	10	14
English proficiency	Proficient	34	94	32	91	66	93
Child with ASD age, mean (SD)		8.00 (4.40)		8.34 (4.62)		8.17 (4.49)	
Age range	3 - 6 years	17	49	17	47	34	48
	7 - 10 years	7	20	10	28	17	24
	11 - 14 years	6	17	4	11	10	14
	15 - 18 years	5	14	5	14	10	14
Total children cared for	1	9	25	8	23	17	24
	2-3	25	69	19	54	44	62
	4 or more	2	6	8	23	10	14
Receive respite	Yes	9	25	12	34	21	30
School placement satisfaction	Satisfied	25	69	26	74	51	72
	Dissatisfied	8	22	6	17	14	20
	Neutral	1	3	2	6	3	4
	No school	2	6	1	3	3	4

Note. WD = written disclosure. WD and Control conditions did not differ significantly ($p < .05$) on any of these characteristics

Table 2. Outcome Means (SD) at Baseline and 6-month Follow-up and ANCOVA Results by Treatment Condition

Outcome (Measure)	Baseline		6-Month Follow-up		F Value ^a	p Value	Partial Eta Squared (η_p^2) ^b	Cohen's d^b
	WD (n = 36)	Control (n = 35)	WD (n = 28)	Control (n = 30)				
General health (SF-36)	55.85 (20.36)	62.69 (16.10)	62.83 (15.84)	65.13 (9.93)	0.00	.998		
Perceived stress (PSS)	22.69 (6.14)	19.63 (7.15)	18.14 (9.47)	19.80 (7.69)	9.14	.004**	.142	.193
Caregiver strain (CGSQ)	55.69 (19.84)	54.00 (18.02)	49.30 (20.52)	48.80 (19.73)	0.11	.738		
Parenting stress (PSI)	129.08 (26.89)	133.06 (25.03)	136.50 (30.76)	139.57 (26.27)	0.71	.791		
Blood pressure								
Systolic	107.24 (12.00)	111.99 (19.07)	108.05 (12.02)	109.40 (14.61)	0.05	.820		
Diastolic	75.51 (9.53)	78.46 (14.14)	75.86 (10.51)	75.08 (10.19)	1.02	.317		
Heart rate	78.87 (10.21)	76.76 (12.14)	79.23 (11.35)	76.49 (12.52)	0.23	.635		

Note. ANCOVA employed baseline values as covariate in testing treatment effect at follow-up. WD = written disclosure; SF-36 = 36-Item Short Form Health Survey ; PSS = Perceived Stress Scale; CGSQ = Caregiver Strain Questionnaire; PSI = Parenting Stress Index. Conditions did not differ significantly at baseline.

^aFollow-up outcomes analyzed with baseline as covariate.

^bPartial eta squared (η_p^2) and effect size (Cohen's d) reported for significant results. Levels of effect sizes indicated as: small effect ($d \leq .20$), medium effect ($.21 \leq d \leq .79$), and large effect ($d \geq .80$). Effect sizes computed using Shadish et al. (1999) effect size calculator.

** $p < .01$.

Table 3. Mean (SD) Cortisol Outcomes at Baseline and 6-month Follow-up and ANCOVA Results by Treatment Condition

Cortisol Measure	Baseline		6-Month Follow-up		F Value ^a	p Value	Partial Eta Squared (η_p^2) ^b	Cohen's <i>d</i> ^b
	WD (n = 24)	Control (n = 29)	WD (n = 20)	Control (n = 20)				
Waking	6.55 (3.97)	6.09 (2.53)	12.39 (10.53)	6.62 (4.49)	4.74	.039*	.165	.923
30 minutes Post-waking	7.24 (4.02)	8.54 (3.84)	9.73 (6.27)	9.95 (5.19)	0.14	.714	.006	
Salivary cortisol (CAR) ^b	0.68 (3.54)	2.45 (3.73)	-2.65 (5.77)	3.32 (3.64)	12.08	.002**	.335	1.271

Note. ANCOVA employed baseline values as covariate in testing treatment effect at follow-up. WD = written disclosure; CAR = cortisol awakening response (30 minutes post-waking - waking). Conditions did not differ significantly at baseline.

^aFollow-up outcomes analyzed with baseline as covariate. Outlier removed (CAR \geq 4 SDs). Salivary cortisol data logarithmically transformed to normalize distribution prior to analysis.

^bPartial eta squared (η_p^2) and effect size (Cohen's *d*) reported for significant results. Levels of effect sizes indicated as: small effect ($d \leq .20$), medium effect ($.21 \leq d \leq .79$), and large effect ($d \geq .80$). Effect sizes computed using Shadish et al. (1999) effect size calculator.

* $p < .05$.

** $p < .01$.

Figure 1. Flow of Participants

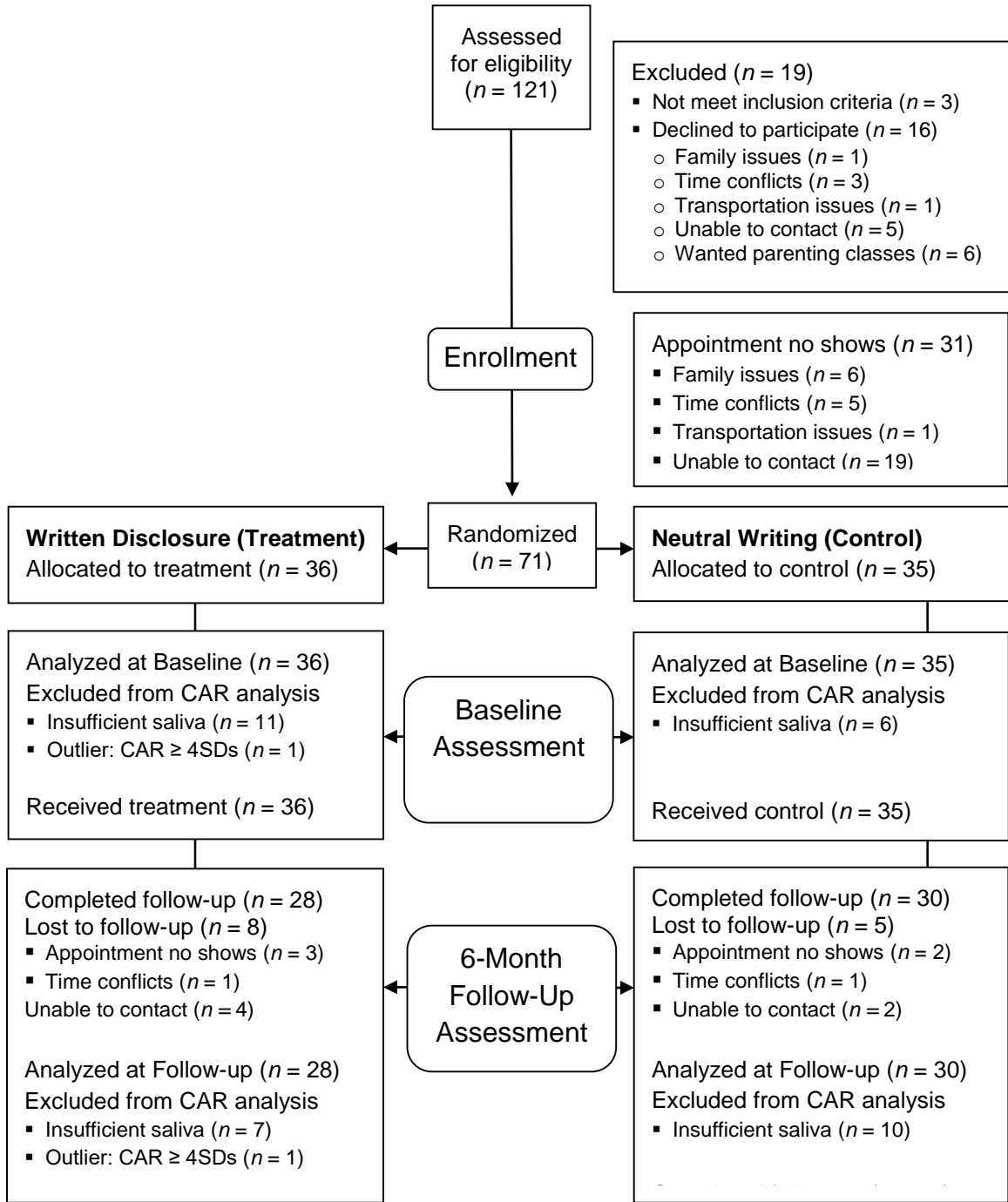


Figure 1. CONSORT flowchart for recruitment and study enrollment. CAR = cortisol awakening response.

Figure 2. Waking Cortisol Concentrations by Treatment Condition at 6 month Follow-up

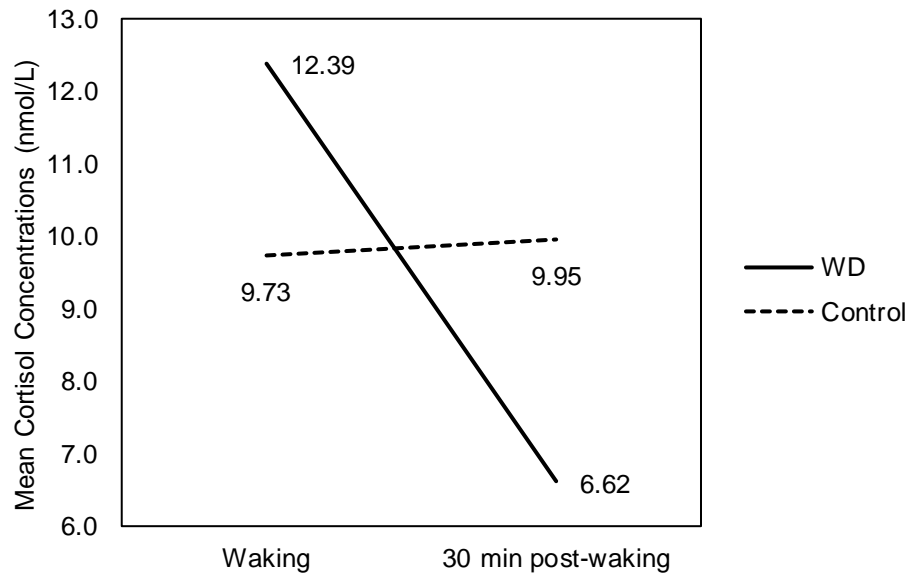


Figure 2. Cortisol reactivity levels by treatment condition. WD = Written Disclosure.