**Symposium Title**: The Dynamic Interplay of Physical Health and Cognition Across Adulthood in People with IDD: Characterizing Modifiable Risk Factors and Compensatory Strategies

**Chairs**: Goldie A. McQuaid[[1]](#footnote-2) & Nancy Raitano Lee[[2]](#footnote-3)[[3]](#footnote-4)

**Discussant**: Gregory L. Wallace3

**Overview**: While risk factors (Campbell et al., 2009) and compensatory strategies (Tomaszewski Farias et al., 2018) related to aging in the general population are well delineated, far less research has investigated these factors in people with intellectual and developmental disabilities (IDDs) across adulthood. This is despite a large corpus of research documenting highly elevated risk for developing Alzheimer’s disease among adults with Down syndrome (Fortea et al., 2021) and emerging evidence that autistic people are also at increased risk for experiencing age-related cognitive decline (Klein et al., 2023) and dementia (Vivanti et al., 2021). Thus, it is of the utmost importance to identify possible modifiable risk factors and compensatory strategies that could be harnessed to optimize aging trajectories among people with IDDs. The proposed symposium aims to address this critical knowledge gap by examining health-related risk factors (i.e., anticholinergic medication use) and psychosocial protective factors (i.e., social engagement and compensatory cognitive skills) among adults with Down syndrome and autistic adults with higher support needs spanning young, middle, and older adulthood.

**Paper 1 of 4**

**Paper Title**: Anticholinergic Medication Use Among Young Adults with Down Syndrome: Relations with Everyday Executive Function and Dementia Screening Questionnaire Scores

**Authors**: Nancy Raitano Lee2, Goldie McQuaid1, Haila Jiddou2, Hannah Grosman2, Jessica McNulty2, Meghan O’Brien[[4]](#footnote-5), & Gregory L. Wallace3

**Introduction**: Both prescription and over-the-counter anticholinergic medications, which block or inhibit acetylcholine’s activity at synapses in both the central and peripheral nervous system, are prescribed at higher rates in groups with intellectual disability (ID) than in the general population (Laura Ward et al., 2022). In the general population, older adults taking these medications demonstrate poorer cognitive outcomes (e.g., worse executive function) and higher incidence of dementia relative to older adults not taking these medications (Coupland et al., 2019; Risacher et al., 2016). Yet, we know very little about anticholinergic medication use (AMU) and its relation to cognition/behavior in specific groups with ID, such as Down syndrome (DS). As DS is associated with precocious-onset Alzheimer’s dementia (AD; Fortea et al., 2021), studies of AMU, particularly in young adults with the syndrome, could identify a modifiable risk factor for AD in this group. Thus, the current research sought to examine associations between AMU and both executive dysfunction and dementia screening scores in a sample of young adults with DS.

**Method**: Close family members of 111 young adults with DS (52 female; ages 18-39; M=27, SD=5) completed questionnaires about their health (including a questionnaire probing medication use), everyday executive function skills (Behavior Rating Inventory of Executive Function – A; BRIEF-A; data available for n=84), and changes in cognition/behavior observed via a dementia screening questionnaire (Dementia Screening Questionnaire for Individuals with Intellectual Disabilities; DSQIID; data available for n=105). Medications were coded for their anticholinergic properties using the CRIDECO Anticholinergic Load Scale (CALS). Participants were then divided into groups based on their current AMU: AMU+ (taking at least one anticholinergic medication) and AMU- (not taking anticholinergic medications). Within the AMU+ group, medication type (i.e., psychotropic versus other) was also coded. Then group comparisons on the BRIEF-A Behavior Regulation (BRI) and Metacognition (MI) Indices as well as the DSQIID total score were examined using independent samples t-tests. This was done first for the whole sample regardless of anticholinergic medication type and then removing those participants who were taking only psychotropic anticholinergic medications.

**Results**: Just under half of the sample (n=46; 41.4%) was taking at least one anticholinergic medication. T-tests comparing the AMU+ and AMU- groups (which did not differ on age or sex ratio; *p*s>.7) revealed higher scores (indicating greater impairments) among those in the AMU+ (n=33) than AMU- (n=51) group on the BRIEF-A BRI (*t*=2.61, *p*<.02, *d*=.58) and MI (*t*=2.43, *p*<.02, *d*=.54). Similarly, higher scores were observed in the AMU+ group (n=43) than AMU- group (n=62) on the DSQIID (*t*=3.15, *p*<.004, *d*=.73). Because individuals with psychiatric and neurological conditions that necessitate medication may have more cognitive challenges, those participants who were taking only psychotropic anticholinergic medications were removed. Analyses were then re-run with the subsample of AMU+ participants who were taking at least one non-psychotropic anticholinergic medication (n=19 for BRIEF-A; n=26 for DSQIID). When this more conservative subsample of participants was examined relative to peers in the AMU- group, results for the BRIEF-A BRI (*t*=1.49, *p*=.14, *d*=.40) and MI (*t*=1.45, *p*=.15, *d*=.39) were no longer statistically significant (but continued to favor the AMU- group). In contrast, group differences on the DSQIID remained (*t*=2.68, *p*<007, *d*=.82).

**Discussion**: As DS is associated with elevated rates of precocious onset dementia and prior research in the general population has documented a link between AMU and dementia risk, the current research sought to examine this relationship in a group of young adults (ages 18-39 years) with DS. Consistent with research in the general population, AMU was associated with greater caregiver reported executive dysfunction and greater reports of declines in cognition and behavior on a dementia screening questionnaire among young adults with DS. However, when participants who were taking only psychotropic anticholinergic medications were removed from analyses, observed executive dysfunction differences were reduced to trend-level findings, but dementia screening questionnaire scores continued to differ between the groups. These results highlight the importance of systematic investigations into AMU and their concomitant risk for AD among individuals with DS, as anticholinergic medication exposure represents a modifiable risk factor for AD.

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**Paper 2 of 4**

**Paper Title**: Anticholinergic Medication Use and Associations with Everyday Memory Problems and Cognitive Decline in Autistic Adults with Higher Support Needs

**Authors**: Goldie A. McQuaid1, Nancy Raitano Lee2, Annissa DeSilva3, Nicolette Cure3, Sophia Cluen3, & Gregory L. Wallace3

**Introduction**: Many commonly used prescription and over-the-counter medications have potent anticholinergic (AC) effects (Gerretsen & Pollock, 2011). Among older adults in the general population, use of these AC medications is associated with declines in cognitive functioning as assessed via the Mini Mental State Examination (Sargent et al., 2020) and via performance-based measures of memory (Risacher et al., 2016). Moreover, AC medications are associated with acute and chronic cognitive impairment (Boustani et al., 2008; Fox et al., 2011), increased risk for delirium (Egberts et al., 2021), dementia (Cai et al., 2013; Mur et al., 2022), mild cognitive impairment (Cai et al., 2013), and Alzheimer’s Disease (Gray et al., 2015). These associations of AC medication use with cognitive problems are collectively referred to as anticholinergic cognitive burden (ACB). Because of high rates of medical conditions (Hand et al., 2020; Lai et al., 2019; Weir et al., 2021) and polypharmacy (Frazier et al., 2011; Mandell et al., 2008; Esbensen et al., 2009; Ritter et al., 2021; Jobski et al., 2017; Vohra et al., 2016; Rast et al., 2023) across the lifespan, autistic adults likely have particularly high AC exposure, and thus ACB risk (McQuaid et al., 2024). Nevertheless, no research has characterized AC exposure nor its associations with memory problems or cognitive functioning in autistic adults with higher support needs. Thus, in a large sample of autistic adults with higher support needs, we sought to i) characterize AC medicine use, and ii) examine its associations with caregiver-rated memory problems and changes in cognition and behavior that have been linked with cognitive decline.

**Method**: Caregivers of 512 autistic adults (aged 18-68 years, mean age=31.2 years; 20.1% assigned female sex) recruited via the Simons Powering Autism Research (SPARK; The SPARK Consortium, 2018) Research Match service completed an online battery of surveys. They reported on prescription and over-the-counter medications used. Medications were coded based on the CRIDECO Anticholinergic Load Scale (CALS; Ramos et al., 2022) as follows: 0=no ACB, 1=low ACB, 2=moderate ACB, 3=high ACB. Two indices of ACB were computed: Total ACB score (sum of AC medications), and an ACB score ≥3, a cutoff identified as a clinically meaningful level of ACB (Carnahan et al., 2006; Rudolph et al., 2008). Caregivers of autistic adults also completed the Observer Memory Questionnaire (*N*=469; OMQ; Gonzalez et al., 2008), a measure utilized for the assessment of everyday memory functioning among adults with an intellectual disability. The version of the instrument used in the current study was comprised of 27 items with responses made on a 5-point Likert scale (1=‘Never/Strongly agree’ to 5=‘Always/Strongly disagree’). Twelve items were reverse scored, generating a total mean item score, where higher scores reflect more observer-reported current everyday memory problems. Caregivers also completed the Dementia Screening Questionnaire for Individuals with Intellectual Disabilities (*N*=466; DSQIID; Deb et al., 2007), which probes changes in cognition and behavior that are linked to cognitive decline. A total of four hierarchical linear regression models were conducted using 10,000 bias corrected and accelerated bootstrap confidence intervals (CI). These models examined ACB associations (total ACB or ACB≥3) with the OMQ or DSQIID mean item scores, after controlling for sex assigned at birth and age.

**Results**: 66% of autistic adults were taking at least one AC medication, with 31% having an ACB≥3. The most common AC medications were antidepressants, antipsychotics, and antihistamines. Regression modeling revealed that even after accounting for sex assigned at birth and age, both total ACB (β=0.19, *t*=4.18, Δ*p*=.00003, ΔR2=.03, CI=[.023, .087]) and ACB ≥3 (β=0.19, *t*=4.15, Δ*p*=.00004, ΔR2=.03, CI=[0.136, 0.388]) predicted greater caregiver-rated everyday memory problems. Modeling also indicated that after accounting for the effects of sex assigned at birth and age, both total ACB (β=0.18, *t*=4.00, Δ*p*=.00007, ΔR2=.031, CI=[.003, .014]) and ACB ≥3 (β=0.17, *t*=3.79, Δ*p*=.0002, ΔR2=.030, CI=[.018, .062]) predicted greater caregiver-rated concerns regarding declines in cognitive and behavioral functioning.

**Discussion**: AC medication use is common (66%) among autistic adults with higher support needs and much greater than non-autistic adults (estimated to be ~20-50%) in the United States (Campbell et al., 2009) who are considerably older (>65y). Studies in the general population show that AC medication use and vulnerability to its adverse effects increase with age (Boustani et al., 2008). Thus, it is important to understand the impacts of these documented high rates of AC medication use and its associations with contemporaneous everyday memory challenges and observer-rated declines in cognition and behavior among autistic adults with higher support needs, particularly as these might be associated with later dementia risk in this group (Hand et al., 2020; Vivanti et al., 2021).

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**Paper 3 of 4**

**Paper Title**: Social Engagement and Healthy Aging in People with Down Syndrome

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**Introduction**: A socially active life is linked to optimal mental health and lower risk of Alzheimer’s disease in the adult general population (e.g., Biddle et al., 2019; Wang et al., 2022). Indeed, social engagement has been associated with reduced depressive symptoms (Biddle et al., 2019) and preserved cognitive functioning with age (Sommerlad et al., 2023; Wang et al., 2022). Little is known, however, about whether adults with Down syndrome (DS) experience similar benefits of social engagement. Adults with DS have high rates of co-occurring mental health problems (Startin et al., 2020). They also have an elevated risk for early-onset Alzheimer’s Disease (AD) (Wiseman et al., 2015) due to the overexpression of amyloid-β (Aβ), an early pathological feature of AD (Mann & Esiri, 1989; Wiseman et al., 2015). It is unclear whether greater social engagement is associated with fewer mental health problems or healthier cognitive aging in adults with DS. The aims of the present study were to: 1) determine factors associated with greater social engagement among adults with DS; and 2) examine the relation between social engagement and the mental and cognitive health of adults with DS.

**Method**: Participants included 142 non-demented adults with DS enrolled in the Alzheimer Biomarker Consortium-Down Syndrome who participated in an affiliated Lifestyle study. Participants were aged 25-61 (M = 39.87 years, SD = 8.70 years) and completed the Modified Cued Recall Test (mCRT; Zimmerli & Devenny, 1995) and the Down Syndrome Mental Status Examination (DSMSE; Haxby, 1989). A study partner reported on the participant’s demographics, mental health using the Reiss Screen for Maladaptive Behavior (Reiss & Valenti-Hein, 1994) and the Glasgow Depression Scale (Cuthill et al., 2003). The study partner also reported on the frequency of social activities participated in during a typical month. The participant underwent MRI and PET imaging using the tracer [11C]PiB. PET Aβ burden was quantified in centiloids (Klunk et al., 2015).

**Results**: Social engagement was significantly associated with premorbid ID (*r* = -.213, *p* = .015), chronological age (*r* = -.235, *p* = .006), type of residence (*r* = .185, *p* = .032), and involvement with employment, volunteer, and/or day program activities (*r* = -.270, *p* = .001). In partial correlations, social engagement was significantly related to the Reiss (*r* = -.195, *p* = .028) and the Glasgow depression scale (*r* = -.183, *p* = .039). Social engagement was not significantly related to the mCRT or DSMSE. However, social engagement significantly moderated the association between higher Aβ burden and lower mCRT score (∆R2 = .339, *F* = 7.901, *p* < .001; β = .105, *p* = .025).

**Discussion**: Socially engaged lifestyles are important for healthy aging in people with DS. Living in a group home or alone (versus with family), and involvement in employment activities (paid, volunteer, or work centers) was related to higher social engagement. Greater social engagement was associated with better mental health and moderated the impact of early AD pathology (i.e., Aβ burden) on memory. Findings highlight the need to remove barriers to social activities for adults with DS and the importance of policies and programs that can foster social engagement.

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**Paper 4 of 4**

**Paper Title**: Use of Cognitive Compensation Strategies and Associations with Daily Living Skills and Health in Autistic Adults

**Authors**: Claire B. Klein[[7]](#footnote-8), Vidya Gadikota7, Katie Rowland7, Elena Lamarche7, Allison Meyer[[8]](#footnote-9), & Laura Klinger7

**Introduction**: There is strong support that the use of visual supports (e.g., schedules, reminders, visual instructions) and increased structure (e.g., routines, limiting distractions) used in Structured TEACCHing are helpful strategies for autistic children in their daily routines (Wong et al. 2015). Cognitive supports, such as visuals, are frequently used among aging adults in the general population to maintain their independence in daily living skills (DLS; Tomaszewski Farias et al., 2018). However, cognitive supports, or cognitive compensation strategies, have not yet been examined among autistic adults. The current study developed a questionnaire of cognitive compensation strategies for autistic adults to 1) Explore the use of cognitive compensation strategies and most commonly used strategies among middle-aged adults to complete daily activities, 2) Examine differences in DLS by use of cognitive compensation strategies, and 3) Contrast the use of cognitive compensation strategies with changes in overall health.

**Method**: Participants were part of a longitudinal cohort diagnosed in childhood at the UNC TEACCH Autism Program between 1969-2000 (Age of diagnosis M=7.29, SD=4.04, range=2.72-16.56) enriched for high support needs (Childhood IQ M=61.71, SD=24.74). Caregivers completed a survey about adult outcomes between 2014-2016 (Wave 2) and 2023-2024 (Wave 3). The survey included a questionnaire on using cognitive compensation strategies based on Structured TEACCHing principles and supports commonly used for autistic individuals. Caregivers rated if the autistic adult had used each strategy in the past 12 months to complete daily activities, and if it was used more in the past year: visual calendar/schedule, alarms as reminders, materials in a place they will see, using a routine, help with transitions, limiting distractions, and incorporating interests to stay engaged. DLS were examined using the Waisman Activities of Daily Living Scale (W-ADL; Maenner et al., 2013). Change in W-ADL was calculated using residuals from Wave 2 predicting Wave 3, with negative scores indicating declines. Changes in health status were rated using a single item comparing the autistic adult’s health to 12 months ago as better, worse, or the same.

**Results**: Wave 3 included 47 participants (Mean age=48, range=40-61). Caregivers reported that at least one cognitive compensation strategy was used by 76% (n=36) of the autistic adults. From most to least common, 45% used a visual calendar/schedule, 37% used a routine, 35% used help with transitions, 33% limited distractions, 33% incorporated interests, 27% used visual supports, 22% put materials in a place they will see, and 20% used alarms as reminders. Of the 36 adults using cognitive compensation strategies, 50% (n=18) reported needing to use at least one strategy more often in the past year (most commonly visual calendar/schedule and incorporation of interests). Change in DLS (W-ADL) ranged from 7.08 to -13.08 with 37% showing declines >1 and 39% showing improvement >1. There were no significant differences in W-ADL change between those who used any strategies (M= -0.92, SD=5.19) and those who did not (M= 0.28, SD=4.06), *t*(45)=.80, *p*=.43, *d*=.28. However, there was a pattern that adults who used more cognitive compensation strategies had lower W-ADL scores at Wave 3 (M=18.94, SD=6.53) compared to adults who did not increase their use (M=23.89, SD=7.59), *t*(34)= -2.10, *p*=.04, *d*= -.70, and a similar, but not statistically significant, pattern at Wave 2 (More use M=19.44, SD=7.16) compared to those who did not increase their use (M=23.39, SD=7.48), *t*(34)= -1.62, *p*=.12, *d*= -.54. Comparison of cognitive compensation strategies with changes in overall health revealed that compared to those who did not increase their use, those who used more cognitive compensation strategies were over-represented in the declining health group (7/8), *X2*(2)=5.83, Exact *p*=.05, Cramer’s V=.40, adjusted residual for declining health=2.4.

**Discussion:** Among a group of middle-aged autistic adults diagnosed in childhood enriched for high support needs, caregivers reported that most are using at least one cognitive compensation strategy to complete daily activities. Almost half of the autistic adults were using a visual calendar/schedule, while over a third used a routine, help with transitions, limited distractions, or incorporating their interests to support them in their daily activities. The use of cognitive compensation strategies was not associated with changes in the DLS (W-ADL) over the past 8.5 years. However, adults who had increased their use of cognitive compensation strategies had lower W-ADL scores and declining health compared to a year ago. These findings indicate that cognitive compensation strategies may be an especially useful tool for autistic adults with lower daily living skills or with worsening health.

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