



# Implications of Employment Changes Caused by COVID-19 on Mental Health and Work-Related Psychological Need Satisfaction of Autistic Employees: A Mixed-Methods Longitudinal Study

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Accepted: 27 January 2021 / Published online: 26 February 2021

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## Abstract

This mixed-methods study examined longitudinal data, assessing Israeli autistic adults' employment-related changes, resulting from the COVID-19 pandemic. In the quantitative phase, 23 participants answered a survey before and during COVID-19, assessing work-status, mental health, and work-related psychological need satisfaction. The qualitative phase included interviews with ten employed participants. Results indicate a significant decrease in mental health of participants who lost their jobs during COVID-19, while participants who continued to physically attend work, maintained pre-COVID-19 levels on all assessed variables. Participants who transitioned to remote-work from home, showed a marginally significant deterioration in mental health and a significant decrease in satisfaction of work-related psychological needs for competence and autonomy. Qualitative accounts supplement these findings and portray advantages and disadvantages of remote-work.

**Keywords** Autistic adults · Employment · COVID-19 · Self-determination theory

## Introduction

The COVID-19 pandemic presents an ongoing crisis, impacting human health and the global economy. Consequences of COVID-19 may be especially challenging for disadvantaged populations in the workforce, such as autistic<sup>1</sup> people. Autism is a lifelong neuro-developmental condition, defined as a continuum of impairments including deficits in communication and social interaction across multiple contexts, concurrent with restricted repetitive patterns of behavior, interests, or activities and sensory sensitivities (American Psychiatric Association 2013). Moreover, autistic individuals commonly cope with relatively high rates of

co-occurring mental health problems, mostly depression and anxiety (Hudson et al. 2019; Uljarević et al. 2020), which can potentially intensify during COVID-19.

Empirical data assessing effects of the pandemic on lives of autistic individuals has not been published to date, but early efforts made to evaluate possible implications, suggest courses of action and point to current directions for research and practice (Amaral and de Vries 2020; Cassidy et al. 2020; den Houting 2020; Pellicano and Stears 2020). In an expert discussion moderated by Cassidy et al. (2020), possible implications of COVID-19 on autistic people were highlighted. Among the pandemic-related challenges mentioned were managing uncertainty, adapting to changes in routine, and dealing with increased social isolation due to physical distancing. On top of these potentially negative outcomes, Pellicano and Stears (2020) suggested the global economic crisis caused by the pandemic also has a negative impact on employment stability of autistic adults.

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<sup>1</sup> Since identity-first language is often preferred by individuals on the autism spectrum (Bury et al. 2020; Kenny et al. 2016), we use the term “autistic” throughout this manuscript.

## Employment Implications of COVID-19

Efforts to contain transmission of the coronavirus introduced unprecedented employment related challenges worldwide (International Labour Organization 2020). In Israel, the first cases of COVID-19 were confirmed in late February 2020. On March 19, a national lockdown was issued, preventing individuals from leaving their home, apart from purposes such as purchasing food or medicine and working in businesses defined as essential. Restrictions were withdrawn during May, and physically attending work was allowed until a sharp rise in infection rates led to a second national lockdown in September 2020. Along with this line of events, businesses were severely affected leading to an increase in unemployment. The Israeli unemployment rate before the pandemic, which amounted to 3.2% of the labor force, sharply rose to about 21% on March 2020.<sup>2</sup> Since then, unemployment rates remained relatively high, with peaks around the two waves that led to the national lockdown on April (36%) and October 2020 (20%) (Israeli Central Bureau of Statistics 2020).

Along with the troubling levels of involuntary unemployment and the poor psychological health outcomes related to them (Mimoun et al. 2020; Paul and Moser 2009; Xiong et al. 2020), employees who remain employed during these times may also face various challenges. Changes in work hours, increased work demand, wage reduction, and alterations of working conditions and environments have been described (Restubog et al. 2020; Solomon 2020). Prominent among the COVID-19 related changes is remote work, which has become a growing phenomenon (Brynjolfsson et al. 2020).

Scientific knowledge regarding the effects of the COVID-19 adaptations required from organizations and employees is scarce, but work–life disruptions are evident (Fouad 2020), possibly leading to shifts in work satisfaction, work motivation and employee well-being. Self-Determination Theory of motivation (SDT: Deci and Ryan 2000) suggests a lens through which these experiences can be viewed and interpreted. According to SDT, there are three psychological needs that should be satisfied in the workplace in order to maintain positive employment outcomes and well-being: autonomy to make choices, competence in the activities we engage in, and relatedness to others, feeling a sense of connectedness and belonging (Baard et al. 2004; Deci et al.

2001). Satisfaction of these psychological needs is positively associated with workers' self-esteem and well-being, and negatively associated with emotional exhaustion (Boudrias et al. 2011; Van den Broeck et al. 2016). It has been suggested that work-related satisfaction of these needs can be jeopardized during COVID-19 due to changes in working arrangements such as working from home (Gagné 2020).

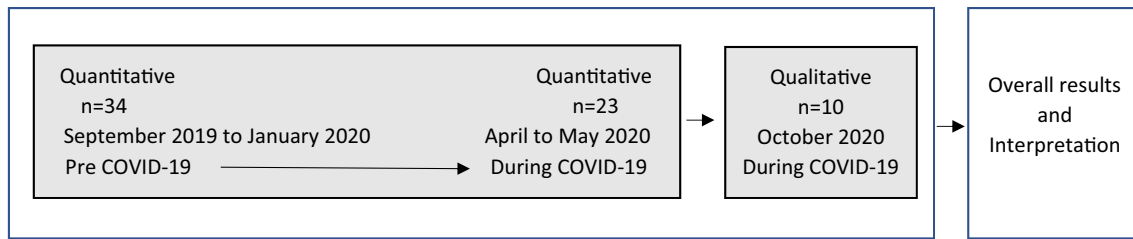
These far-reaching effects on employment are likely to influence employment experiences of autistic adults (Pelligrano and Stears 2020). Employment outcomes in this population are relatively poor to begin with, presenting high rates of unemployment and unfavorable job conditions for those who do work (Nicholas et al. 2019; Wei et al. 2018). These outcomes are associated with challenges stemming from the autism diagnosis such as communicating with employers and colleagues, adapting to change and uncertainty, or managing one's sensory experiences in the workplace. These stressful experiences may also exacerbate co-occurring neuro-psychiatric conditions that are common among autistic individuals (Anderson et al. 2020; Black et al. 2020; Hedley et al. 2018; Scott et al. 2019). Other barriers are related to environmental factors such as stigma and a lack of modifications in recruitment processes and work environments (Black et al. 2020; Johnson et al. 2020; Nicholas et al. 2018; Waisman-Nitzan et al. 2020). This disadvantaged starting point makes this population especially vulnerable at times of global employment instability.

Without underestimating the alarming consequences of COVID-19, efforts have been made to recognize potential silver linings in the expansion of home-based remote work opportunities for the general population (Kramer and Kramer 2020) and for employees with disabilities (Schur et al. 2020). For autistic adults, employment was previously almost exclusively related to the possibility to work outside the home, while 'home' was related to a lack of activity (Anderson et al. 2020). Therefore, implications of remotely working from home through telecommunication are still unknown for this population.

At current times, when the pandemic is ongoing worldwide, empirical data is essential in order to improve knowledge, shape proper interventions and consequently improve the work-life quality of autistic adults. Therefore, the current study examined longitudinal data before and during the COVID-19 outbreak in aim of answering the following research questions: how did COVID-19 influence employed autistic adults in terms of: employment status and work-arrangements (such as: layoffs, furloughs, or remote work from home); job-satisfaction; satisfaction of employment-related psychological needs; and mental health?

It was hypothesized that:

<sup>2</sup> Data is based on the Israeli Central Bureau of Statistics (CBS) Labor Force Surveys (2020). Unemployment rates during the COVID-19 pandemic (starting March 2020), include employed persons temporarily absent (on furlough) from work due to reasons related to the Coronavirus pandemic (reduced workload, work stoppage, and other labor market restrictions) and individuals who stopped working due to dismissal or closure of their workplace.



**Fig. 1** The study's sequential mixed methods design model

- Working conditions will worsen for autistic employees, i.e., higher unemployment rates and negative changes in work conditions will be found.
- Job satisfaction, employment-related psychological need satisfaction and mental health will deteriorate in relation to pre-COVID-19 reports.

In addition, due to the lack of existing research on the employment experiences of autistic adults during the pandemic, a qualitative exploration of their experiences was conducted.

## Method

### Participants and Procedure

We utilized a sequential mixed methods explanatory design model (Bishop 2015; Grace et al. 2013), collecting data at three timepoints. Figure 1 graphically illustrates the research model.

The first set of data (T1) was collected between September 2019 and January 2020, before the pandemic broke out in Israel, as part of a broader cross-sectional research project examining employment of autistic adults. Inclusion criteria for participation in the T1 survey were: (1) All of the participants reported having a formal recognition of their ASD diagnosis by the National Insurance Institute of Israel or by the Ministry of Labor, Social Affairs and Social Services—both services require a formal DSM-based clinical diagnosis. For further confirmation, participants were required to state that they received a formal diagnosis of ASD and asked to mention the profession of the diagnosing expert (psychologist, psychiatrist, neurologist, and/or pediatrician) and age of first diagnosis, along with any additional co-occurring diagnoses. (2) a minimum of 18 years of age; (3) at least 12 years of formal education; (4) having worked for at least six consecutive months, within the last 2 years, either in the current job, or in a former one. Therefore, all of the participants were employed at T1. Participants were recruited through organizations offering employment-related services for

autistic adults. An invitation to participate in the study was sent via e-mail or phone, providing a link to a survey administered via an online survey platform. Thirty-four participants (4 females), aged 20–54 years ( $M = 29.44$ ,  $SD = 8.1$ ), completed the survey at T1.

During the COVID-19 outbreak, objectives of the study were broadened in order to assess the longitudinal changes that occurred as a result of the pandemic. All 34 participants were contacted again via e-mail, between April and May 2020 (T2), inviting them to participate in a follow-up survey assessing effects of COVID-19 on employment. Of the 34 participants at T1, 23 (67%) completed the follow-up survey. T2 participants (4 females) were aged 20–49 years ( $M = 30.22$ ,  $SD = 7.4$ ). In order to evaluate the possibility of a selection bias, we examined T1 data for differences in job-satisfaction, need fulfillment and mental health, between participants who eventually participated in the follow-up survey, and those who did not participate. No significant differences were found.

The third phase of the study (T3) was a qualitative examination of participants' work experience under COVID-19, which was employed in order to supplement and contextualize the earlier quantitative results. This phase was carried out during October 2020, when the effects of COVID-19 were still evident in Israel, and a second lockdown was issued. All of the participants (16) who reported working in T2 were contacted by e-mail again, offered to participate in a short interview or answer an open-ended questionnaire. Ten participants (two females) responded. The T2 measures of job-satisfaction, need fulfillment and mental health did not significantly differ between participants who took part in T3 and those who chose not to participate. Participants were interviewed according to their preferred communication choice: 7 via zoom tele-meeting, 2 on a telephone conversation and 1 provided a written response. The content of the interview was documented in detail by the interviewer, the first author of this study. Content analysis was utilized to analyze the working participants' employment related experiences during the COVID-19 outbreak (Elo and Kynäs 2008). For interpretation purposes, the interviewer kept reflective notes during the interview, the initial reading of the transcripts and data analysis.

All procedures were approved by the first author's university IRB. Participants expressed informed consent online and were monetarily compensated for their time.

## Measures

### Background and Employment Data

Participants were asked to indicate their age and gender, number of work hours per week, approximated salary, and number of employment months at the current job. Participants were asked to report the extent to which they received professional support from a vocational worker. Answers ranged from 0 (not at all) to 4 (often). At T2 and T3, participants were also asked to report on their working arrangements (physically attending work/remotely working from home/in furlough/unemployed).

### General Health Questionnaire–Short Form (GHQ-12; Goldberg 1992)

This questionnaire examines participants' emotional distress over the last four weeks (e.g., "I feel unhappy or depressed"), on a 4-point Likert scale. The Hebrew version of the GHQ-12 showed internal consistency of 0.87 (Litwin 2002). Internal consistency of the scale for the current data was 0.81 for T1. The GHQ was completed by all the participants at T1 and T2.

### Minnesota Satisfaction Questionnaire (MSQ) short-form (Weiss et al. 1967)

A 20-items questionnaire, measuring satisfaction with different aspects of work (e.g., "the praise I get for doing a good job"), scored on a 7-point Likert scale. Internal consistency for the Hebrew version of the scale was 0.89 (Littman-Ovadia et al. 2014). Internal consistency of the scale for the current data was 0.88 at T1. The MSQ was completed by all participants at T1, and only by working participants at T2.

### Basic Psychological Need Satisfaction and Frustration—Work Domain (Chen et al. 2015)

This 24-item scale assesses the satisfaction/frustration of autonomy, competence, and relatedness needs at work. Participants rated their feelings about their jobs in the past 4 weeks on a 7-point Likert-type scale (e.g., "at work, I feel capable at what I do"). The questionnaire showed good reliability across various cultures (Chen et al. 2015). Separate measures were calculated for each subscale: autonomy, competence and relatedness. Scales' internal consistency for the current study (T1) was 0.73, 0.72, and 0.85 respectively.

This measure was completed by all participants at T1, and only by working participants at T2.

## Individual Interviews

Administered at T3, the interview protocol was grounded in the quantitative phases' results. It consisted of 8–10 questions that sought further understanding of COVID-19 related effects on participants' employment, specifically on their experiences of working from home vs. physically attending work (see Online Appendix 1 for a list of interview questions).

## Results

### Quantitative Results

#### Descriptive Measures

Among the 23 participants who answered the T2 survey, sixteen (69.6%) were employed, of whom ten (43.5%) reported physically going to work and six (26.1%) worked remotely from home; four participants (17.4%) were in furlough, and three (13%) were unemployed. That is, 30.4% of the participants who were employed at T1, did not keep their jobs during the pandemic. All of the employed participants excluding one, maintained their job from T1. All were salaried workers, with the exception of one self-employed participant.

Ten participants worked in the field of computer and mathematical occupations,<sup>3</sup> mostly software Quality Assurance (QA). Four worked in food preparation and service, two in office and administrative support. Each of the following occupation groups included one participant: engineering; production; sales; education; personal care and service; protective service; and the arts. Working participants' experience at their current job ranged between 1 and 90 months ( $M=33.75$ ,  $SD=29.03$ ), and they reported 2–60 weekly working hours ( $M=35.81$ ,  $SD=17.61$ ); 50% worked the same hours as before the pandemic, 31.3% worked fewer hours per week, and 18.8% worked more hours per week. Most working participants (87%) maintained the same salary levels between T1 and T2, two increased their salary, along with an increase in the number of working hours, and one reported a decrease in salary, despite working the same number of hours.

<sup>3</sup> Occupation groups are categorized according to the Bureau of Labor Statistics, U.S. Department of Labor (U.S. Bureau Labor Statistics 2018).

At T1, 43% of the participants received some extent of support from a vocational worker, and only 23% received vocational support at T2. This drop may be related to limitations that prevented vocational support workers from working during the pandemic.

**T1–T2 Comparison**

Non-parametric analyses were used due to the small sample size. To examine the hypothesized deterioration in participants’ mental health (i.e., the increase in GHQ-12 scores), Wilcoxon signed rank tests for paired samples were employed separately for the entire sample, and for each working status. Results, detailed in Table 1, indicated a significant increase in participants’ emotional distress, as measured by the GHQ-12. However, the separate examination by employment status revealed a significant effect among participants who do not work, a marginally significant effect among participants working from home, and no significant change in GHQ-12 scores among participants who physically report to work (see Fig. 2).

Between-group comparisons of participants who physically attended work, participants working from home, and

unemployed participants at T1 and T2 did not yield any significant differences.

Next, we examined job-satisfaction differences and work-related psychological need satisfaction among the entire group of working participants, and separately for employees physically attending work, and for employees working from home. The analyses showed no job satisfaction differences between T1 and T2 at any level. Regarding work-related psychological need satisfaction, as shown in Table 2, Wilcoxon tests for paired samples indicated a significant decline only in participants’ satisfaction of the psychological need for competence. However, separate analyses revealed no changes in satisfaction of psychological needs among participants who physically attended work, whereas a significant decline in the satisfaction of the psychological needs for competence and autonomy was found for participants working from home following COVID-19 related restrictions (see Fig. 3).

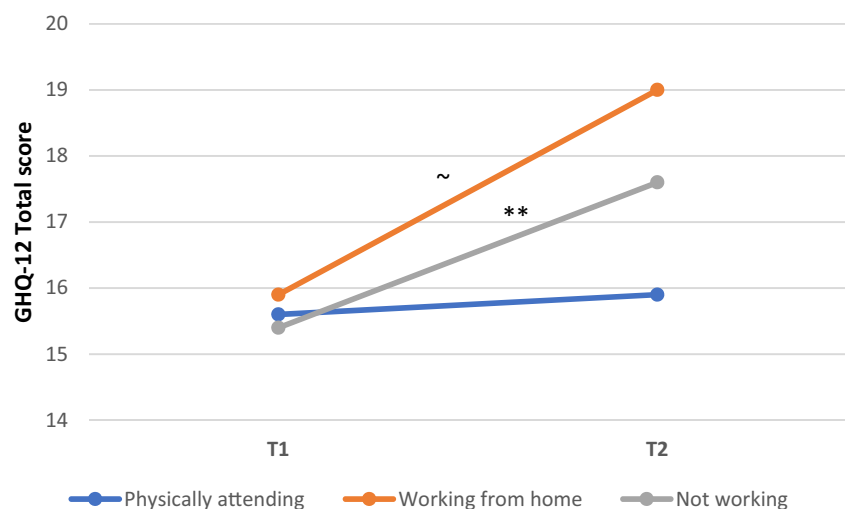
Between-group comparisons of participants who physically attended work and participants working from home on the work satisfaction and work-related psychological need satisfaction measures at T1 and T2 did not yield any significant differences, except for a

**Table 1** GHQ-12 changes from T1 to T2, according to employment status

	T1		T2		Wilcoxon Z	P (one-tailed)
	M	SD	M	SD		
Whole sample (n=23)	15.6	3.7	17.2	3.6	- 2.67**	0.004
Physically attending work (n= 10)	15.6	4.5	15.9	3.6	- 0.21	0.419
Working from home (n=6)	15.9	3.9	19	3.8	- 1.57*	0.058
Not working (n=7)	15.4	2.8	17.6	3.3	- 2.37**	0.009

\*p < 0.1; \*\*p < 0.01

**Fig. 2** Differences in mean GHQ-12 scores from T1 to T2, by employment status



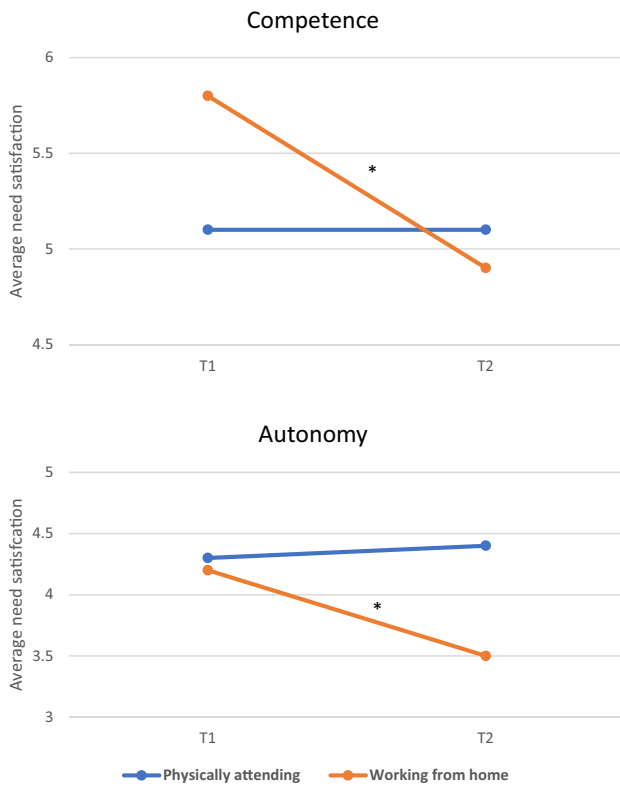
Note: ~p=.058, \*\*p<.01

**Table 2** Changes in need satisfaction of competence, autonomy, and relatedness from T1 to T2, according to employment status

	T1		T2		Wilcoxon Z	P (one-tailed)
	M	SD	M	SD		
<i>Whole working sample (n = 16)</i>						
Competence	5.3	0.9	5.0	0.7	- 1.76*	0.039
Autonomy	4.3	0.7	4.1	1	- 1.14	0.127
Relatedness	5.6	1	5.7	0.9	- 0.03	0.488
<i>Physically attending work (n = 10)</i>						
Competence	5.1	0.9	5.1	0.8	- 0.34	0.366
Autonomy	4.3	0.6	4.4	0.9	- 0.12	0.453
Relatedness	5.4	1.1	5.6	1	- 0.49	0.312
<i>Working from home (n = 6)</i>						
Competence	5.8	0.6	4.9	0.7	- 1.99*	0.023
Autonomy	4.2	0.8	3.5	0.8	- 1.68*	0.047
Relatedness	6.0	0.8	5.8	0.6	- 0.84	0.200

\*p < 0.05

marginally significant difference in the satisfaction of autonomy needs at T2 (Mann Whitney U = 13.5, Z = 1.79, p = 0.073).



Note: \*p < .05

**Fig. 3** Changes in mean competence and autonomy need-satisfaction from T1 to T2, by employmentstatus

### Qualitative Results—Subjective Work Experiences During COVID-19

All of the ten working participants who responded maintained their job from T2. Seven participants worked in the field of computer and mathematical occupations, mostly software QA. One participant worked in office and administrative support, one in education, and one in protective service. According to their T2 responses, five were working from home and five attending the workplace. The interviews revealed that between T1 and T3, Eight of the participants had the chance to experience work from home and physical work attendance.

Employment-related changes following the pandemic were evident in the work experiences shared by all the participants. A few described relatively mild changes, but most experienced considerable changes in their jobs, whether positive or negative. Data were analyzed and presented according to three categories, aligning with the quantitative results, in order to supplement and contextualize the main findings. The first category—employment-related changes and mental health, relates to overall work experiences and work satisfaction during the pandemic. The second category addresses changes in employment-related psychological need satisfaction. The third category focuses on the working from home experience, listing advantages and disadvantages of this arrangement.

### Employment-Related Changes and Mental Health

In the face of change, interviewees’ descriptions show that maintaining employment was a protective factor from the negative influences caused by the pandemic. Participants mentioned the positive aspects of having a secure job in

times of instability, and that they were not preoccupied with the consequences of the pandemic due to their ability to maintain a steady job and provide for themselves and (for some)—for their families. N, a 36 years-old male, working in software QA, described the advantages of a stable job:

I don't think that I am preoccupied with the coronavirus and its' effects. I have a stable job and financial stability. We're not struggling. We take care of ourselves and wear masks, I don't worry about things I have no control over. I have a workplace that wants me... If I didn't have a job, that would have been a whole different story.

Employees who physically attended work maintained a familiar daily routine. For some, work conditions even improved due to a less crowded work environment, and a calmer atmosphere because other employees work from home. Y, a 25 year-old male working in software QA, mentioned switching to company transportation services due to closure of public transportation, which he found to be a positive experience:

This bus drive is something I experience every day... it's a fun time for me. I rest, I play, I watch videos, it's kind of a daily ritual. A formal exit from work out to my safety zone, to my inner world.

S, a 43 years-old female, working in an administrative governmental job, also described the positive aspects of serving fewer clients, who during COVID were seeking service only in essential cases. She shared her feeling that people in these times were more patient, having a sense that “we're all in this together”. N, a 36 years-old male, working in software QA also described a calmer working environment:

There are physically fewer people at work, the atmosphere is a little different, positively different, feels more like home... there are fewer people coming in to use our limited resources... there are opportunities to make the job more efficient... it's fantastic.

The COVID-related silent work environment was not always considered an unambiguously positive aspect, as O, a 28 years-old male, who worked in software QA in an educational institute described: “The advantage is that it's quieter, but it feels a little sad... sleepy, many of the employees don't attend work at all, for me it's not a positive change”.

To conclude, maintaining a daily routine of attending work in such unstable times was described as a highly positive experience. Moreover, working in a less crowded environment appeared to add benefit to the work experience during COVID-19, given there was still enough employee attendance to maintain social encounters, but possibly diminish their complexity.

For employees who transitioned to working from home, changes were clearly more prominent. Three out of five described the transition to remote work from home with high satisfaction, stating that it is their preferred working arrangement. However, it seems that working from home left them somewhat more vulnerable in terms of their mental health. For example, R, a 33 years-old male, working in QA, favorably described his home working arrangement: “The transition was amazing! there's no commuting time, I control my physical surrounding, no noise, not too much light when I don't want it... definitely positive”. Due to the sensory sensitivities that are characteristic of autism, the ability to control one's sensory environment was clearly stated as a positive aspect. Nevertheless, R also disclosed negative experiences during the COVID-19 period: “I know that emotionally, during the last six months I felt I'm deteriorating at certain timepoints. I don't know if it's working from home or other things. There was a depressive episode, two weeks when I thought I can't go on [working] and I'm going to quit... questions about what I'm going to do with my life... maybe it is because there's more time... when you clear up all the noise you have more time to think about the big things”.

A similar experience was described by E, a 20 years-old male, who works in internet technical support. He also gave a very positive description of working from home, but concurrently mentioned:

I didn't leave the house for three months. It was irritating because I couldn't actually sit at home all day. I didn't physically go to work until a month ago. I came there once, was exposed to a colleague diagnosed with COVID-19 and had to go into self-isolation. It was no fun... being home drives you crazy.

Given these accounts, it appears that remote work from home was positively described by autistic employees with regards to sensory preferences, among other reasons. At the same time, shortcomings that are not directly related to the job performance and satisfaction may also arise. Comparisons between these work-from-home experiences to the previous experiences of participants maintaining work attendance, highlight the possible advantage of physically attending work, as a way of preserving social encounters, staying busy and keeping away from self-deprecating thoughts. Possibly, the incidence of co-occurring conditions of anxiety and depression for autistic people, could have increased during home confinement and social isolation associated with working from home. These inferences support the quantitative finding that participants who transitioned to remote work from home showed a marginally significant increase in emotional distress, regardless of job satisfaction, which remained stable.

## Employment-Related Psychological Need Satisfaction

Participants shared their thoughts regarding the effects of COVID-19 on their employment-related psychological need satisfaction. They portrayed both satisfaction and frustration of their employment-related psychological needs during these times of change. Changes in need-satisfaction were categorized by the SDT conceptualization of three basic needs: competence, relatedness and autonomy.

**Competence** A number of the participants working from home reported a proficiency in tele-communication and other technological aspects of the job, which even allowed them to become a source of support for other employees. E, a 20 years-old male, working in the field of internet support, described an experience of competence as he helped fellow-workers, mentored new employees, and even expanded his working hours as a result. R, a 33 years-old male, working in software QA, shared: “It isn’t officially my job to support other team members, but it became my [unofficial] role. My bosses are aware and appreciate it”. Thus, it appears that proficiency in use of technological platforms that were necessary for remote work facilitated feelings of competence among some of the interviewees.

Alongside these accounts of successful coping with the transition to working from home, some interviewees reported they had to extend the boundaries of work hours in order to do so: “I sometimes work off hours and even weekends to maintain productivity” said A, a 49 years-old male, working in data-labeling. M, a 30-year-old female working as a special-education teacher in high-school, described great difficulties maintaining home-work boundaries:

A student calls at midnight crying, I can’t ignore the call...I mostly wanted to sleep... I remember I was frustrated that it wasn’t as efficient as regular teaching, the feeling I was useless... but then I saw that they are learning so I felt better.

It appears from M’s description that partial satisfaction of the need for competence was achieved only after a frustrating period in an unfamiliar work situation. The acknowledgement that learning, the goal of her job, is still being carried out led to a restored feeling of competence. These accounts demonstrate how challenging the reduced structure associated with working from home may be for some autistic adults, sometimes resulting in attempts to reappraise their experiences. These reappraisals allow them to maintain their sense of competence despite the ill-structured, constantly changing, environment.

Along with technological abilities and dedication that enabled to maintain productivity, some aspects of the job were not equally achieved while working from home. The physical presence was necessary for using facilities that were

difficult to reach from home (such as access codes, advanced software), and learning processes were difficult to promote with remote communication: “There are courses to take, so I sometimes come to work physically... I like to ‘play around’ in the lab... from home it could take a whole day. In the lab you can practice” said E (20, male).

Overall, subjective experiences of most participants working from home suggest they were able to maintain productivity levels and satisfy the need for competence even without face-to-face personal encounters. A considerable number of autistic employees in this study worked in the field of information technology for whom the technological environment may be a comfort zone. Many of them described clearly defined goals for productivity as a positive aspect. The decrease in competence found in the quantitative results, can be associated with learning experiences related to professional development that were delayed when physical attendance was not optional, and task performance that was less efficient from home due to dependence on work-based equipment. Furthermore, the feeling of competence might have been enhanced in the retrospective reflection at T3, which was obtained a considerable time after the transition to work from home. Satisfaction of the need for competence may have been more challenging at T2, but improved along with experience and adaptation.

**Autonomy** The quantitative results show a decrease in the feeling of choice, for employees who transitioned to working from home. M (30, female), teaching high-school students, expressed the distress from working remotely and the fear of being strained to these undesirable working conditions. These feelings are portrayed vividly through her experience later on that year:

At the beginning of the school year [September 2020] I went to the school management and said that if I ever have to teach via Zoom again, I’m taking furlough... it turns out you can’t. I made a fuss about it. I am a lot more scared of the pressure of working remotely than of the coronavirus.

While many non-autistic teachers may have had difficulties teaching remotely during the pandemic, for M, the need to transform the nature of the interaction with her students led to high levels of distress. Facing the possibility of working in the same stressful situation was experienced as a violation of her autonomy. Another employee expressed a preference for physically attending the workplace, although the organization did not have the option to do so, even after the governmental guidance allowed physical attendance. These subjective experiences portray the reduced satisfaction of the need for autonomy.

Interestingly, other employees working from home specifically mentioned a preference to do so, and did not explicitly



share experiences of reduced choice, although their survey results did support the trend of reduced autonomy need-satisfaction. Again, a retrospective bias could be at play. At T3 most of the employees had some extent of choice between working from home and attending work, that might have reestablished the satisfaction of the need for autonomy.

**Social Relatedness** The quantitative results showed that the feeling of social relatedness to employers or colleagues was maintained for employees attending work, as well as for employees working from home. Although the sense of control achieved in the physical workplace by knowing who to approach, where and when, had changed with the transition to work from home, it did not negatively affect the feeling of social relatedness. This positive aspect could be related to the fact that all employees shared these unexpected circumstances, not specifically excluding autistic employees. The feeling of connectedness was also achieved through work-related support offered by employers or fellow workers: “There was a group of teachers that was super-active during COVID, and we all shared information... I had who to turn to if I had a problem”. (M, 30, female).

Most of the participants were satisfied with their ability to stay in touch through various telecommunication platforms (E-mail, WhatsApp, video-conference, and telephone calls). T, a 24 years-old male, who works with geographical information systems, described: “I realized I’m friendly, but not *that* friendly. This [social] aspect doesn’t affect me. There are days I need [social encounters] but still... some people prefer face to face, for me it’s the same”. The extent of the need for face-to-face communication varied among participants, but overall, it was relatively low, and they did not mention the absence of social encounters per se as a disadvantage. Dissatisfaction related to the general absence of social encounters caused by COVID-19 was mentioned, but was not specifically related to workplace encounters and relationships.

### Remote Work from Home: Advantages and Disadvantages

The fact that most participants experienced work from home along with physically attending work, offered a unique perspective on the advantages and disadvantages of both arrangements. Data at T2 was collected during and shortly after the first lockdown, when organizations had to find prompt solutions in order to maintain work under social distancing guidelines. At this time, employees’ choice was limited, and changes were relatively new. Since then, flexibility regarding physical attendance, working from home and combinations between the arrangements was made possible. The positive and negative aspects of working from home collected throughout data analysis are summarized in Table 3. They form a preliminary list of pros and cons

from the perspective of autistic adults, some presumably align with experiences of TD employees, and others may be unique to this population.

## Discussion

The current study offers a preliminary empirical examination of the implications of COVID-19 work-related changes on mental health and work-related psychological need satisfaction of Israeli autistic employees. It also offers a first insight into autistic employees’ experiences of remote work from home vis-à-vis physically attending the workplace.

It was hypothesized that following COVID-19, working conditions will worsen for autistic adults, showing higher unemployment rates and negative changes in work conditions. In support of this hypothesis, findings show that 30% of the autistic employees included in the sample, lost their jobs or were on furlough during COVID-19. Although the sample is small, rates are consistent with the sharp unemployment rise in the general population in Israel (Israeli Central Bureau of Statistics 2020). Unemployed participants also showed a significant increase in emotional distress, aligning with previous studies supporting the negative consequences of unemployment (Paul and Moser 2009) that are particularly severe in this time of global crisis (Mimoun et al. 2020; Xiong et al. 2020).

Findings were more encouraging for participants who maintained their jobs. In contrast to the hypotheses, employment variables such as working hours and salary levels did not change considerably for the members of this group. Employees who maintained their daily routine of physically attending work, did not show significant deterioration on any of the variables assessed in this study: job-satisfaction, work-related psychological need satisfaction and mental health. For this group, as explicitly portrayed by the participants, work served as a protective factor from the potential negative implications of COVID-19. For some, the circumstances arising from the pandemic even led to an improvement in their subjective feelings of well-being related to the reduction in work-load and less crowded work-environments. These findings stress the importance of employment stability for autistic people, providing an anchor, even at times of turmoil and uncertainty.

Employees who transitioned to working from home during the COVID-19 outbreak, presented an interesting group profile. The opportunity to work from home allowed them to maintain employment under COVID-19 restrictions, avoiding the troubling possibility of unemployment. During COVID-19, occupational fields that were more likely to shift to working from home had fewer people laid off or furloughed (Brynjolfsson et al. 2020). High-tech companies in Israel had 50 percent of their employees, who

**Table 3** Participants' accounts of advantages and disadvantages of remote work from home, and relevant quotes

<i>Advantages</i>	
No commuting times	I get more sleep because I don't have to drive to work in the morning... I am home at five in the afternoon instead of six because I didn't leave the house. It feels good (Y, 25, male, software QA)
Customizing sensory needs	I control my physical environment, sensory stimulation, there is no noise, not too much light... it's great. I don't have to compromise if someone else listens to music... (R 33, male, software QA)
Increased work–life balance	There's the advantage of managing my time more freely when I work from home... I can engage in my hobbies and express myself better than within the rigid arrangement of attending work, punch in and punch out (R, 33, male, software QA)
Increased work autonomy	For me it's more fun, the comfort of home, I can do what I want while working... there is nothing in my way, a supervisor isn't looking over my shoulder (E, 20, male, Internet technical support)
Lower risk of coronavirus infection	Personally, I prefer working from home right now because of the coronavirus wave, to minimize the risk of infection. There's the fear that I will test positive and others will need to isolate because of me (O, 28, male, QA in an educational institute)
Opportunity to learn new technological platforms	I learned new technological tools, presentations and quizzes on various platforms (M, 30, female, high-school special education teacher)
<i>Disadvantages</i>	
Technical problems	The internet connection crashed, and it was on a work day. They only fixed it in the afternoon and I couldn't work at all (T, male, 24, geographical information systems)
Social communication complications	Immediate feedback from colleagues sitting next to me, it's better than catching them on the phone. I can also see them physically and it's more convenient, [I prefer] the possibility to ask colleagues and supervisors a question instantly and directly (N, 36, male, working in QA)
Social isolation	The lack of personal touch that is part of working in the office, and the atmosphere, hallway conversations, shared meals (A, 49, male, QA)
Interruptions and distractions	At home things that you have to do come up, so it is hard to keep concentrated (O, 28, male, QA in an educational institute)
Difficulty learning new tasks	It's difficult to learn things, if there are things that I don't know I can't broaden my knowledge. It isn't easy to do it by email or through a once in a while conversation (T, male, 24, geographical information systems)
Limited access to workplace facilities	The ability to work from home is sometimes limited. For instance, to access the computer you need a magnetic card. When I work from home, I have to ask somebody to do it for me. It's a disadvantage I don't like (Y, 25, male, Software QA)
Blurred emotional boundaries between the work and home	For me, home is a place of being calm and secure, a place of my inner world. Bringing work into it can be emotionally harmful. Bringing the work home is uncomfortable and it's hard to unwind because there's no transition process from work (Y, 25, male, Software QA)
Difficulty defining and limiting work hours	It was difficult to know when to stop. I would stay awake until 3 a.m. grading [class work], returning, they correct and I grade again and return... (M, 30, female, high-school special education teacher)

were employed prior to the crisis, work from home (Achdut 2020). A substantial number of employees in the T2 sample worked in the field of computer and information technology, benefitting from this advantage. Notably, this may favorably bias our results.

However, for employees working from home, even though salary levels and job satisfaction were preserved, levels of mental health marginally deteriorated compared to routine working conditions. These findings suggest that working

from home did not have the immediate protective effect it had for employees who continued to physically attend work. Interestingly, these findings sometimes coincided with positive subjective accounts of remote work. Examination of the overall data suggests that along with the comfort and advantages of working from home, participants may be more vulnerable to negative aspects of the pandemic such as social isolation, and changes in routine, that eventually influenced their emotional state. These findings can be explained by

Carillo et al.'s (2020) study of employees from the general population. Their work differentiated between remote work carried out in a conventional context, and remote work induced by the pandemic, which has a sudden, mandatory nature. The latter demands a quick adaptation to a new work situation, possibly leading to a feeling of insecurity.

Although the current study does not include a comparison group of typically developing employees, studies assessing remote work raise findings that can be associated with our examination of employment-related satisfaction of the psychological needs conceptualized by the SDT framework—competence, autonomy, and social-relatedness.

Contrary to our hypotheses, satisfaction of the need for social relatedness remained stable in the absence of daily face-to-face interactions. In the general population, social isolation and lack of communication with colleagues were indicated as central disadvantages of remote work (Boell et al. 2013; Carillo et al. 2020). Our findings, that feelings of social-relatedness remained after the transition to remote work, and that most participants were satisfied with the alternative communication possibilities and the supports received from their employers, are encouraging in relation to remote work arrangements of autistic adults. At the same time, it is probable that work relationships of most of our participants were established before the transition, creating the basis for the continuity of social-relatedness need satisfaction. Notably, the period of exclusively working from home was relatively short for most employees who participated in the interviews. A longer period of social isolation might have led to a cumulative deterioration in the satisfaction of the need for social relatedness.

Deteriorations in satisfaction of the need for competence and autonomy did arise, but were only partly supported by the qualitative data. Accounts of the feeling of competence suggest that the participants had relatively high technological and physical resources needed to conduct work tasks remotely, for some—even to the extent of offering support to colleagues. Furthermore, most were relatively experienced employees who had a good comprehension of their employers' expectations. An important factor in the satisfaction of the need for competence is feedback from the manager, which was mentioned as an obstacle to remote work adjustment in the general population (Carillo et al. 2020), and was also found to be an important factor in employment success of autistic adults physically attending work (Waisman-Nitzan et al. 2020). Arguably, although working from home allowed fewer opportunities to get the employer's explicit feedback, the participants' depictions suggest that employers' expectations for remote work productivity were clearly defined for all employees, helping them to maintain the feeling of competence. Difficulty learning new tasks and limited access to workplace facilities, align with previous studies regarding remote work in the general population

(Nakrošienė et al. 2019). They appear to have partially been resolved after physical access was made possible. It is plausible that as opportunities to combine remote work with physical attendance grew, the need for competence satisfaction was restored and reflected in the retrospective qualitative accounts, obscuring original impediments in competence need satisfaction.

Regarding the need for autonomy, remote work allowed employees to control their own schedule, suggesting a higher satisfaction of autonomy and choice, as was found in the general population (Boell et al. 2013). This characteristic, along with some of the participants' preference for working from home, may be considered contradictory to the decline in autonomy need-satisfaction shown by the quantitative results. With regard to this incongruence, it is important to note that T2 data was collected at the beginning of the COVID-19 outbreak, shortly after these involuntary changes were introduced. The need to work remotely, which was forced by the pandemic, possibly led to a feeling of professional uncertainty. By the time T3 interviews were conducted, participants had more experience with remote work, and many of them could choose a personal balance between remote work and physical attendance, re-establishing a satisfaction of the need for autonomy.

As apparent in the results of the current study, the increase in remote work from home is one of the most observable work-related changes resulting from the COVID-19 pandemic, with common estimates predicting remote work may stay after the pandemic is over (Brynjolfsson et al. 2020; Carillo et al. 2020; Kramer and Kramer 2020). Results give a first insight into the effects of remote work on autistic employees, pointing to advantages and disadvantages that are detailed in research of employees from the general population (Biron and Veldhoven 2016; Boell et al. 2013; Carillo et al. 2020), along with aspects that are more unique for the autistic employees, such as controlling the environment due to sensory sensitivity (Waisman-Nitzan et al. 2019). For autistic people, the possibility of working from home may open doors, especially for those who cope with severe social anxiety or high sensory sensitivity. For these individuals, commuting to work in a shared space poses a barrier that they could not breach. Labor-market integration is oftentimes highly challenging, especially in demanding organizations that recruit full-time employees who dedicate most of their time to work. Participants in this study positively indicate that remote work gave them the opportunity to engage more flexibly in their hobbies. This flexibility made possible by remote work may fit autistic people with high engagement in their areas of interest, who have previously avoided seeking employment, and allow them to enter the labor market with less discrepancy and conflict between competing motivations (Goldfarb et al. 2019).

## Implications for Professionals and Employers

The findings of this study demonstrate various advantages and disadvantages associated with physically attending work vs. working from home. An individual approach is therefore in place, taking the heterogeneity of autism into consideration, as one's advantage can be another's struggle. For example, commuting to work can be a stressful experience leading to sensory overload for one, or a positive way to recover from the pressure of work and enter the comfort of home for another, as portrayed in this study. Vocational support should include an initial consideration of the autistic employees' preferred working arrangement, either attending work, remotely working from home if possible, or a balanced combination of both. Under COVID-19 circumstances, if employers are granted the flexibility to allow a percentage of employees to maintain work attendance, this possibility could be pertinent for autistic employees for whom physically attending work can have a protective effect.

If change is mandatory, the new working arrangements should be clearly specified (e.g., preferred channels of communication, work hours, productivity expectations etc.). Autistic adults who transition to working from home may maintain productivity (Aspinall 2020), but with the cost of high personal resources which could result in burnout. Our findings suggest that taking performance and job satisfaction into account may not be enough in assuring that employee needs are being met. Therefore, job-related supports and accommodations, which were already found necessary for success of autistic employees (Harmuth et al. 2018; Lee and Carter 2012), should also address and continually monitor psychological need satisfaction, in order to ensure employment stability along with professional development and overall satisfaction. Since any change in familiar routine of autistic employees can potentially lead to difficulties, the process of returning to the initial working arrangement after a period of remote work also deserves careful attention, ensuring that proper supports are offered.

It is also evident from our findings that proficiency in tele-communication helped employees maintain competence, and even gain a social advantage through helping their colleagues. Hence, intervention programs targeted at promoting employment integration of autistic adults should consider adding a curriculum of technological skills, possibly expanding vocational opportunities, and establishing employee resilience in face of the dynamic labor market during and post COVID-19.

## Limitations and Future Research Directions

The findings presented in this report are based on a small, unrepresentative sample, and therefore should be taken

with prudence. Participants had a relatively steady job pre-COVID-19, and do not fully represent the various challenges that autistic adults encounter in the labor market. Our sample includes a high ratio of employees in the field of computer and information technology, an industry that was less effected by the pandemic, compared to others. Thus, transferability of the findings to the general population of autistic adults is limited. Further studies should be carried out with diverse samples, in different fields of occupation and in various countries affected by COVID-19.

Further research examining the effects working from home can provide clearer identifications of which individuals are fitted for remote work arrangement, and what are the ways to support them. While the current study focused on transition and change, employees that are newly recruited to a working-from-home job might have different characteristics in regard to their employment-related needs, and different ways of satisfying them. Identifying this population and the factors promoting their employment success may hold valuable implications for various stakeholders dedicated to expanding work opportunities for autistic adults.

Due to the small ratio of females in the current study, comparisons based on gender were not carried out and should be further explored in relation to working from home. Finally, studies including a comparable group of typically developing adults can shed light on similarities and differences between these two groups.

## Conclusion

The opportunity to compare longitudinal self-reports, gathered a relatively short time before the coronavirus outbreak, gives a unique perspective into the changes occurring in these unprecedented circumstances. The study highlights the importance of employment stability, and offers a preliminary insight into remote work experiences of autistic employees.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s10803-021-04902-3>.

**Acknowledgements** This study has been supported by graduate research grants to Yael Goldfarb from the Organization for Autism Research and the National Insurance Institute of Israel. We thank AQA and Gal College for their assistance with participant recruitment, and our participants for their continued willingness to take part in the study and share their valuable experiences.

**Author Contributions** YG, EG and OG designed the study. YG collected the data and analyzed it with OG. YG and OG wrote the final manuscript, according to comments by EG. All authors read and approved the final manuscript.

## Compliance with Ethical Standards

**Conflict of interest** All authors declare they have no conflict of interests.

**Ethical Approval** The study was approved by the institutional ethics committee, University of Haifa.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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